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ABSTRACT

The first year of a project to develop, evaluate, and disseminate a system for occupational program planning in community colleges is discussed. The focus of the first year was the development of the system. This report of the first phase is divided into three parts. In part 1, materials and concepts important to the development of the system are reviewed. First, the literature on occupational program planning in community colleges is explored. Second, important concepts in the development of the project system is discussed. Part 2 contains the pilot edition of the project system. Part 3 contains the references for the development of the project system. Annotated bibliographies are presented for the use of both researcher and practitioner in the area of program development. (DB)

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A DECISION SYSTEM FOR OCCUPATIONAL PROGRAMS IN COMMUNITY COLLEGES

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PREFACE

During the course of three years of service to our colleagues in the two-year colleges of New York State, the Institute staff and cooperating professors have heard many expressions of need. This research and development effort is one response to such needs. Professor Dalva E. Hedlund accepted the challenge to examine the extant curriculum decision-making process; Lawrence E. Gray and Paul C. Chakonas of the Bureau of Two-Year Colleges, New York State Education Department, encouraged us to develop a proposal addressing the needs; an advisory committee and outside consultants have helped the project staff toward development of a useful system. This report represents an interim step in a process that will continue this partnership through the remaining sequential steps of piloting, revision, inservice instruction, adaptation and implementation.

Stated in more abstract terms: this effort represents a process through which a third party (The Institute) may marshall practical assistance to clientele in the application of significant educational research findings to the operational needs of our institutions. The sequential relationships include: (1) Cooperative Identification of needs; (2) Researching of alternatives; (3) Cooperative preparation of a proposal focusing on the strategies judged most viable; (4) Identification of proven practices; (5) Application of theory in the synthesis of a model and/or system; (6) Piloting of the model and/or system; (7) Cooperative revision; (8) Dissemination through inservice education; (9) Adaptation and implementation in the individual institutional setting. Through this process we can hope to develop a body of "proven practice" that will serve both the practitioner and those responsible for preparation of educational practitioners.

We quote from a statement by the project staff (page 28): "A good system for program development must overcome both the haphazardness of the traditional decision process and the abstractness of 'new' systems. It must be based in the reality of community colleges but it must try to reorder that reality in logical ways. A good system blends reality and theory for the improvement of the development process".

The project staff has acknowledged the contributions made by numerous individuals. Understandably, the principal investigators have not spoken of their importance to this project. Professors Dalva E. Hedlund, Joan R. Egner, and George J. Posner have given unselfishly of their time and professional expertise. Robert Young and Barbara Montgomery, in the role of research associate, have provided the day-by-day endeavor that is so important to the crystallization of a product. The rest of us have been pleased to provide the kinds of support necessary to facilitate the efforts of such a powerful team.

Professor John Wilcox
Director, Institute for Occupational Education

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We are indebted to many people. Research assistants Paul Clements, Marlene Ginsburg, Michael Herriman, and Myra Malmed have worked long and hard hours to research and develop the project system. The system could not have been produced without their contributions. Professor John Wilcox, Director of the Cornell Institute for Research and Development in Occupational Education, has been a vital source of support for the project since its inception. Deans from six community colleges -- Robert Chapman, Corning; Ronald Horvath, Broome; William Lynam, Monroe; Thomas Mecca, Tompkins-Cortland; Ralph Miller, Finger Lakes; and Gerald Walsh, Jefferson -- have provided the "reality base" for the project. Their expertise has stimulated our efforts to produce a workable and worthwhile system for occupational program development in community colleges. Herbert Bienstock, regional director of the Bureau of Labor Statistics, U.S. Department of Labor, has generously furnished the annotated bibliography on concepts and sources of data for manpower analysis.

The following people have contributed their time and expertise to the development of the project system: Herbert Bienstock, Regional Director of the Bureau of Labor Statistics, U.S. Department of Labor; Dr. Robert L. Bruce, Professor of Education, Cornell University; Dr. William W. Frank, Associate Professor of Industrial and Labor Relations, Cornell University; Dr. Robert Perloff, Professor of Business Administration and Psychology, University of Pittsburgh; Dr. Edward Sussner, Professor of Economics, University of Pittsburgh; Dr. Thomas F. Green, Adjunct Professor, Cornell University; Dr. Steven J. Klees, Assistant Professor of Education, Cornell University; and Dr. Gene M. Winter, Associate Director, Cornell Institute for Research and Development in Occupational Education.

INTRODUCTION

OCCUPATIONAL EDUCATION IN A TIME OF CHANGE

> It took man roughly 475,000 years to arrive at the Agricultural Revolution. It required another 25,000 years to come to the Industrial Revolution. We have arrived at the "Space Age" in a hundred and fifty years--and while we do not know where we go from here, we can be sure that we shall go there fast. (Frankel, 1964)

A decade has passed since Charles Frankel made that statement. The events of the last ten years verify his prediction that unforeseen and rapid change would be a fact of American life.

In the last ten years, Americans have been to the moon several times. Vietnam has exploded and ebbed. "Student activists" have come and gone; so have "hippies" and "yippies" and "black panthers" and "weathermen." The political confidence of the "new frontier" has given way to the political uncertainty of the 70's. The fuel-burning Cadillac has become a symbol of the worst, as well as the best, of American affluence. Civil Rights has spawned new movements for peace and ecology and women's rights and other groups and causes.

Labor in America has not been immune to change. Many years have passed since this was a rural, agricultural nation. Industrial America is changing. The American labor force produces more services than material goods. Its unskilled workers must become skilled in such areas as abstract thinking or be replaced by automation. The primary requirement for employment is changing from physical power to mental agility.

These changes increase the role of education in the careers of American workers. Havighurst (1966) asserts that the right to work is tied to the acquisition of education. Bebout (1965) states that education helps workers adapt to automation, therefore, formal education is a prerequisite for decent living in society.

For at least two reasons, community colleges play a major role in the education of American workers. First, community colleges are the most accessible institutions of higher education in the nation. Geographically, financially, and academically, community colleges make their education accessible to Americans. Second, the changes in the labor force require education beyond high school but, for most jobs, below the baccalaureate level. About half of the labor force is employed in semi-professional and technical jobs; community colleges want to educate this middle "fifty percent" of American manpower (Gleazer, 1967).

The community college has been involved in occupational education for many years. This involvement began with the signing of the Smith-Hughes Act in the 1920's. The Depression increased the need for community college occupational programs. After World War II, the community college expanded dramatically. Among the reasons for its expansion were the emergence of new fields of technology and the vocational-educational needs of returning military personnel (Medsker, 1971).

Community college education has continued to expand. During the 1960's, new community colleges opened at the approximate rate of one per week (Carnegie, 1970). Student numbers doubled between 1964 and 1969; by 1969 half of the beginning college students in the

United States were enrolled in two year colleges (A.A.J.C., 1971, U.S. News, 1969).

Community college occupational programs have been affected by the changes in society and its work force. Cohen (1971) says that two-year occupational programs are unstable because they reflect rapid technological and sociological changes. Cohen describes a shift from drafting, machine tooling, automotive and agriculture programs to "space age" programs such as electronics and computer technology. Today, some "space age" technology programs lose enrollment to service programs such as nursing and law enforcement. Even some service programs are losing students because they do not reflect current needs in the job market. As the job market shifts, so does the enrollment in two-year college occupational programs.

These shifts create important problems for community college educators. The problems are philosophical: what education enables students to be effectively employed in a world of change? They are also pragmatic: technical and vocational education programs cost more than liberal arts programs if the necessary equipment and personnel are secured (Blocker, 1965). If an occupational program fails to attract students, then the monetary impact can devastate the entire college.

The problems are not discrete. The pragmatic affects the philosophical. The failure of a program can prevent a college from achieving its total goals. This failure-prevention is especially likely in today's political climate. The public cares more about the efficient use of its tax dollars than it cares about the abstract educational concerns of community colleges.

The well of tax dollars has dried up. During the 1960's college educators became spoiled by the easy availability of public money. The 1970's have been different. Tax levies have failed and budgets have been cut. Educators have been forced to show what is needed, where it is needed, and why it is needed to a tax-weary public. The public has demanded maximum efficiency and economy for the use of its scarce resources (Martorana, 1971). Many community college educators have had to fight to maintain existing programs. It is double the effort for them to establish new and expensive vocational programs.

What should they do? When should they commit college resources to a new occupational program? When should they choose not to risk those resources? What information do they need to know?

A project to answer these questions has been funded by the State Education Department through the Cornell Institute for Occupational Education. The project intends to develop, evaluate and disseminate a system for occupational program planning in community colleges. The first year of the project has been devoted to the development of the system; the second is directed to the evaluation and dissemination of the system.

The goal of the project is to help community college educators investigate a program thoroughly and systematically before they decide its fate. The educators need to know particular information at particular times in order to make appropriate decisions about an occupational program. A system should help them make those decisions.

The watchword of the project has been "usability". The system must be usable by community colleges. The project will fail if the system is never used by the colleges. The system must find a home on the desks, not the shelves, of community college educators.

The usability of the system is increased by the involvement of community colleges throughout the project. Deans from six community colleges -- Broome, Corning, Finger Lakes, Jefferson, Monroe and Tompkins-Cortland -- have helped develop the system during the first phase of the project. The system will be tested in four community colleges during the second phase. Finally, it will be disseminated to community college educators in regional workshops in New York State.

This document is a product of the first phase of the project. It is divided into three parts. In part one, materials and concepts are reviewed that are important to the development of the system. First, the literature on occupational program planning in community colleges is explored. Second, the reader is informed of important concepts in the development of the project system. Both of these reviews can serve as resources for the researcher of occupational program systems. Part two is color-coded in blue; it contains the pilot edition of the project system. Although the system is not presented in its final form, the pilot edition can serve the practitioner in the community college in several ways. These ways are explicated in the introduction to part two. Part three contains the references for the development of the project system. Annotated bibliographies are presented for the use of both the researcher and practitioner in this area of program development.

PART ONE

AN HISTORICAL SURVEY OF THE LITERATURE ON PLANNING OCCUPATIONAL PROGRAMS IN COMMUNITY COLLEGES

Literature on occupational curricula in two-year colleges began to proliferate after World War II. Phebe Ward (1947) was one of the first writers to recommend a procedure for planning occupational programs.

First, Ward suggested that colleges study existing programs at other institutions. Then the need for the proposed program within the local community should be determined by a survey of potential employers. Employer needs for personnel should be ascertained as well as the types of positions for which two-year college graduates could be adequately trained. Then the needs of the student population should be explored by means of follow-up studies on recent graduates and pre-registration contacts with potential students. If a need for the program on the part of potential employers and students could be established, then an Advisory Committee should be organized to help plan the program. The Committee should consist of well-known leaders from labor, management and community groups. The Committee should be used throughout the lifetime of the curriculum, not just in the planning stages of the program. The objectives of occupational proficiency and total self-development of the student should then be established. On the basis of these objectives an occupational analysis would: name the courses, plan the objectives, list and arrange the jobs in learning order, analyze the jobs, and develop lesson plans. Modern equipment for the program must then be purchased and outstanding instructors selected. Instructors should be chosen from business and

industry on the basis of their mastery of the occupation, their personality, their aptitude for teaching, and their appreciation of well-rounded training. Instructional materials should then be developed and provision made for the student to have on-the-job as well as classroom experience. High standards of performance must be established; close coordination with parts of the college, such as counseling, maintained; and in-service training for faculty provided. The college should capitalize on available community resources and, in return, offer the use of college facilities to the community. Finally, good subjective and objective techniques for evaluating occupational training and general education should be devised and used for the purpose of revising the curriculum to meet student and community needs.

Jesse Parker Bogue (1950) also encouraged the expansion of two-year vocational programs. His book emphasized that occupational curricula should be generated from community and state needs.

B. Lamar Johnson (1952) proposed a set of broad educational goals for vocational courses. These courses should enable students to perform successfully in an occupation. However, Johnson felt that a community college should also embrace wider goals that help students to acquire social understanding, formulate a philosophy of life, and carry out citizenship responsibilities.

Stephen E. Epler (1955) discussed a major problem of community colleges. He suggested that college administrators collect data on: the number of seniors in the high schools which have contributed significantly to past and present enrollment in the college; the number

of students in grades 1-12 in feeder schools; the births and deaths in the area for the past two decades; and migration in the age groups under twenty.

Lawrence L. Bethel (1956) emphasized the importance of community needs and community support in planning programs for occupational education. He felt the need for a strong liaison between the community college and local business and industry. The community should have an opportunity to evaluate the programs of the college. The institution should have considerable freedom to experiment with and develop new vocational programs. Faculty should spend time assessing community needs and revising programs in the light of changing social and economic conditions, and college administrators should take the responsibility of synchronizing community college plans with local business and industry.

Ralph R. Fields (1956) agreed with Bethel on the importance of community needs and community participation in planning occupational programs. Surveys should be made of employment possibilities in the area. Census data and state reports should be used as a basis for projecting possible enrollments. Continuous informal contact between employers and faculty could ensure that the college was meeting the needs of the community. Advisory committees should help develop vocational programs. Fields indicated four basic principles of program development: (1) a program must be need-centered; (2) everyone in the program must be concerned with its development and improvement; (3) the program must represent the uniqueness of the community in which it exists; and (4) evaluation is necessary for program improvement.

Edwin Engles (1957) tried to combine theories of administrative decision-making with the need-survey approach. Engles presented a checklist for teachers, department chairmen, curriculum committees, and administrators to use when establishing, continuing or abolishing new courses. He developed two lists of criteria. The first was for faculty and dealt with academic need. The second was for administrators and was concerned with economic feasibility. However, Engles' system had some defects. It did not come to terms with the problem of what to do if some but not all of the criteria were met. It also contained some mutually exclusive criteria.

Edward Litchfield (1959) analyzed college decision-making processes by dividing them into five separate steps: (1) definition of the issue; (2) analysis of the existing situation; (3) calculation and delineation of alternatives; (4) deliberation; and (5) choice. However, he felt that the problem with large universities was the lack of a control structure for decision-making. The staff was not available for the careful calculation of decisions. Therefore, decisions were delegated to specific departments while administrators merely served as figureheads. He suggested that a number of academic vice-presidents should research issues and evaluate alternative courses of action. Organized staff meetings would consider possible alternatives to a given decision. The president should have sufficient staff to aid him in budgeting, personnel work, organization, academic research and total institutional planning. Litchfield felt that it was extremely important that decisions <u>not</u> be made by one person. In the five steps of his

rational decision-making process there were roles for faculty, deans, president and trustees.

The problem of occupational educational planning has also been approached from the point of view of student sensitivity to career opportunities (1961). A survey was made of the post-high school plans of juniors and seniors in New Jersey high schools. It was found that the students were highly rational in their choice of occupational goals. This is meant in the sense that many of them chose to pursue programs of study which would prepare them for positions in which there were serious shortages of personnel.

B. Lamar Johnson (1964) presented arguments for and against various alternative practices in program planning. He then made recommendations on conducting effective surveys and on making good use of the advisory committee.

Clyde Blocker, Robert Plummer, and Richard Richardson (1965) described important elements in initiating a technical program. The curriculum should be closely related to the requirements of the occupation: it should be developed with the advice and support of the industry in question and it should be sensitive to changes in the occupation. Over-specialization should be avoided. The program should not be approved for all graduates. Community leaders should share the responsibility with educators for identifying manpower needs and planning programs to meet them.

James Thornton (1966) discussed a community survey approach to occupational education decision-making. Administrators should base their

decision on whether or not to introduce a new program on the results of the survey. If the program is introduced, a lay advisory committee should inform the community of the program and receive advice from community members. Special long-term advisory committees should be established for specific curricula. Among the general questions to consider in the establishment of programs are: (1) How specialized should the program be? (2) How many liberal arts courses should be included? (3) Are there employment possibilities for students who finish the program? (4) Will students remain for the entire program? and (5) How qualified should a student be to get into the program?

Moses Koch and Priscilla Woolley (1967) described their experiences and problems in planning a new program for urban planning assistants. They interviewed planning and development agencies in order to determine whether or not an employment market existed for urban planning assistants. Their next problems were in developing curricula for the program. They had difficulties in finding professional planners who could take the time to help plan the program. Recruitment of students also posed many problems. However, HUD sponsored the program, therefore, a full-time program director was hired to deal with these problems.

Albert Riendear (1967) discussed occupational education in a context of change. He analyzed: the nature and objectives of post-high school education; community involvement in the college occupational program; the specific functions of advisory committee recommendations; and expectations of advisory committee members.

The Advisory Council on Vocational Education (1968) made a series of recommendations for the improvement of occupational education planning. These included: an increased awareness of the need for different kinds of training to meet different educational goals; a clearer delineation of the relative responsibility of public agencies and private employers; further study of the merits of on-the-job vs. institutional training programs; an evaluation of the relative merits of the "work" and the "study" aspects of work-training programs; an analysis of the overlap among federal programs; and exploration of new methods for finding the unemployed and motivating them to enter training programs; and an evaluation of the effectiveness of existing training programs.

M. H. Charness, C. H. Ritterhouse, and R. C. Heald (1969) analyzed the major stumbling blocks to effective decision-making in program planning for occupational education. These included a lack of sufficient time to study problems; an excessive focus on the financial aspects of decision-making; the conflicting need to satisfy many diverse groups within the institution and the community; a lack of adequate skills to provide the necessary research support; and the failure to define goals in operational or measurable terms.

Brandon B. Smith and Jerome Moss, Jr. (1970) discussed various steps in the curriculum development process. These steps were considered to be: (1) the specification of the role of training; (2) the identification of educationally relevant tasks; (3) the selection of what tasks should be taught; (4) an analysis of the tasks through Gagne's task analysis technique; (5) a statement of performance

objectives; and (5) the specification of the instructional sequence. Among the more important curriculum changes discussed in the seminar were an increased emphasis on the "products" of instruction, a greater task orientation, and a higher value placed on non-verbal and skill-related experience.

John B. Teeple (1970) emphasized that the college must allocate its resources according to clearly defined goals and well-ordered priorities. Manpower requirements must be projected in accordance with general trends and with the college's own goals such as health, education, and social welfare. The estimates of future job openings due to attrition as well as to newly created jobs must be included. The importance of national vs. local manpower projections should depend on the mobility of the population served by the college and on the special characteristics, if any, of the region. Teeple concluded the article by posing the questions of how to develop and implement a plan. The answer was "not by yourself". He emphasized the importance of wide-spread involvement and commitment for the success of the plan. This approach to administrative decision-making is very similar to the one Litchfield (1959) proposed.

The Carnegie Commission (1971) recommended that programs be planned in such a way that varied educational experiences could be provided to people at all stages of life. This could be accomplished by the use of apprenticeship programs, in-service training in industry, and part-time certification programs. Opportunities for higher education and the degrees it affords should be available to persons throughout their lifetimes and not just immediately after high school. The

Commission suggested that society as well as the individual would gain if work and study were mixed throughout a lifetime. A sense of isolation and of sharply compartmentalized roles is felt by students, workers, young people and elderly people. This feeling could be reduced if more students were workers, more workers were students, and all ages were mixed on the job and in the classroom.

Arthur Berchin (1972) focused his attention on the costs of various types of instructional modes -- small group, large group, etc. -- and suggested that the least expensive modes should be considered for use in the community college.

Dewey Allen Adams (1972) analyzed the various phases of program planning and course development. Course development is divided into three phases. The first phase is the preparation phase which focuses on job description, task analysis, course objectives, criterion examination, target population, course prerequisites, and prerequisite testing. The second phase is called the development phase. It involves outlining, sequencing, content selection, procedures selection, sequence and lesson plan completion, and course tryouts. The third phase, known as the improvement phase is directed to a comparison of performance with objectives, a comparison of the objectives with the job, and revision and tryout.

Kenneth G. Skaggs (1973) surveyed many of the factors to be considered in planning new programs. He claimed that a narrow focus in curriculum development in many two-year colleges leads students into dead-end jobs. Many programs are developed through community or state insistence. Students are not trained as well in community

college programs as they are in apprenticeship programs. Therefore, Skaggs suggested that curricula be re-evaluated continuously because of changing technology. Also, more field work experiences should be provided for students.

Edmund Gleazer, Jr. (1973), in a discussion of decision-making in two-year colleges, discussed the increased role of the state and the legislature in the decision-making process that has resulted from increases in the financial support sought from the state and legislature and from pressures from the taxpaying public for fiscal accountability. He noted, however, that this trend has not gone unresisted by local colleges, boards, and communities. Gleazer analyzed the importance of the administration in decision-making in two-year colleges, but he failed to comment on faculty and student participation in the decision-making process.

Dean N. Evans and Ross L. Neagley (1973) offered a step-by-step approach to the design of a dynamic educational program. Their steps included: (1) identification of the needs of the community that can be met by the college; (2) the determination of the basic philosophy which will undergird the program; (3) the organization of a citizen's committee to advise the college on career programs; (4) the establishment of basic learning sequences for the program: and (5) the completion of personnel and logistical support plans for the process of instructional development.

Finally, David S. Bushnell (1973), proposed a strategy for change which is applicable to the decision of whether or not to implement a new program. This strategy consists of five steps: (1) the problem

must be diagnosed; (2) the objectives must be formulated and criteria established; (3) the constraints and resources must be identified; (4) potential solutions to the problem must be selected; (5) alternative solutions must be evaluated; and (6) action must be taken.

Despite an abundance of discussion, there have not been many changes since 1947 in the recommended procedures for planning occupational education curricula in two-year colleges. Even though administrative decision-making theory has been added to the need-survey approach, the actual decision on whether or not to adopt an occupational education program is largely a hit or miss operation. Skaggs (1973) points out many of the 'misses' in community colleges today. The question remains as to whether or not an effective systematic decision-making structure can be applied to the planning of occupational education programs. Conducting need-surveys does not insure that the data obtained from such surveys is used effectively. More data may be necessary. An important task is to construct a decision system for occupational programs which leads to better decisions by community college administrators.

A REVIEW OF THE DEVELOPMENT AND USE OF MODELS AND SYSTEMS IN EDUCATION

The previous chapter traced the development of occupational program planning in two-year colleges. That development was marked by attempts to provide systematic coherence to the planning of occupational programs. This chapter discusses concepts which are important in the systematization of educational decisions. The major concepts are models and systems, both of which have been used and abused in educational theory.

Models

A model helps describe or conceptualize an aspect of a phenomenon, or, as is frequently said, a part of reality (Ryan). It is an explanatory device, though its adequacy is always open to question. The simplest model is the physical scale-model, a three-dimensional representation of a clearly observable object, e.g. an airplane. A more complicated physical model is oftenseen in science classrooms, the molecule. Spatial relations are represented in both models. The scale model can facilitate the perception of physical appearance. It can also demonstrate the relationships of parts and their representation of certain laws (of physics, mechanics, strength of materials, etc.). The molecule shows the spatial relationship of particles though it does not show the size and movement of the particles.

The numerical quantification of spatial relationships enables those relationships to be modelled mathematically as well as physically. Mathematical models are commonly used in engineering, economics and even linguistics and psychology.

The most important aspect of a model is its explanatory power. Some models explain relationships of parts to one another. Other models deal with the reaction of phenomena to the introduction of new information or phenomena. This is the level of concern of the present project. Some models attempt to explain a level of purpose of phenomena. This level is not fundamental to the concerns of the present project.

Wallhaus specifies the uses of models as follows:

> ..."To...permit feasible and economical experimentation on real-world systems without incurring the cost risks and expenditures of time which to be required in actuality.
>
> To...allow us to formulate, communicate and discuss hypotheses.
>
> To...bring about an understanding of the system variables and their relationships.
>
> To...make it possible to forecast and project for planning and decision making.
>
> To...allow control over the time scale...allow long time intervals to be collapsed.
>
> To...enable us to control and monitor real world processes."
>
> (1969, p. 127)

Models explain things. Good models are also heuristic devices. They allow experimentation or testing of the phenomena they model. But they do not guarantee that the performance of the model will match that of the phenomena being modelled in a real situation. Testing an airplane model in a wind tunnel or on a computer (a mathematical test) may bring out flaws in design or materials but it will not guarantee that the real plane will fly.

One of the main problems with models is their justification and validation. The process of modelling does not contain any safeguards against logical errors either in the representation of the phenomena or interpretation of the model. Nor can the model explain any properties that do not occur in the phenomena being modelled. The simplicity of the model may highlight certain features or relationships that are not immediately apparent in the phenomena being modelled. Thus, models have some important uses even though they have no logical properties other than those existing in the phenomena being modelled.

Systems

Perhaps more confusion surrounds the notion of "system" than is found with "model." "System" has two general and accepted uses -- a common-sense use and a scientific use. The mix of common-sense uses with scientific uses causes confusion.

In the common-sense use a system recognizes the relationship of parts or attributes to a whole phenomenon. The parts and whole may be of any level or degree of generality.

The scientific use involves cybernetics, the study of systems control. Cybernetics is used to explain puzzling aspects of biological and physical phenomena which cannot be explained by considering only single elements of the phenomena. It stresses rather the interaction of all elements of the phenomena. The essential feature of cybernetics, (the word derives from the Greek word for "governing"), is the stress it places on seeing phenomena in terms of systems.

Two developments of the cybernetics approach are general systems theory and systematics. The first attempts to reduce all the sciences

to very general principles under which they can be subsumed -- it seems to stress the unity of science as an end in itself. The criticism levelled at general systems theory is that it disregards important features of disciplines in an effort to find relationships that substantiate the general view. Systematics refers to the general approach of establishing systematic relations between fields and disciplines.

Perhaps the most coherent view of systems theory can be found in Walter Buckley's Sociology and Modern Systems Theory and Modern Systems Theory and the Behavioral Sciences -- the latter an edited collection of articles. More extravagant claims are found in von Bertalanffy's Robots: Men and Minds.

The systems view is not a recent contribution to knowledge. The history of science shows many uses of a systems analogy to find relationships between what seem to be discrete phenomena or events. But great attention has been paid to the systems approach recently, partly because of the general advances made in interdisciplinary studies (particularly in the areas of biology, biochemistry, environmental studies and electronics) and partly because of the advances in high speed computing. In computing, systems organize data for simulation studies, etc.; the design of an overall set of routines for computer programs and data is called systems engineering.

The limitations of systems are similar to those of models; the subsuming of data under a systems framework does not endow that data with extra explanatory or predictive power even though it may clarify the

data so that less obvious relationships become apparent. Systems are also limited by their exact relationship to the phenomena they represent; i.e., they are certain kinds of representation, the kind being determined by the person who designs the system. For example, a subway system might be represented graphically to show relationships of distance between lines and stations, or it might be designed to show time between stops represented as distances on a graphic scale.

"Systems" and "models" are often used as interchangeable terms. In some of the literature the term "systems model" occurs. This refers to a model of a phenomena conceived of as a system. The representation of a subway system could be said to be a systems model. The distinction between system and model is as follows: system is more suitably applied to a certain view of phenomena (an abstraction), whereas a model refers more to a representation of phenomena. Even with this distinction, it is difficult to really delimit the terms. As Silvern says, "A system is what the person identifying it says it is" (1971).

Systems and Models in Education

Both models and systems have been used in education. It is more accurate perhaps to say that various parts of education have been analyzed for their systematization. The areas most exposed to a model or systems view are administration and curriculum. Questions of management, decision making, planning and counselling are susceptible to clarification when seen as interactive systems and when modelled in general ways. In curriculum, models and systems have been developed for curriculum planning, implementation and evaluation.

There is some historical precedent for conceiving of education as being composed of interacting systems -- perhaps this could be said to begin with Herbart. The major contributor of recent times is Leonard Silvern; in a number of publications he urges a systems engineering approach to all of education and particularly to instruction. Silvern interprets instruction as a dynamic system with feedback from occupations and the product (student) performance that permits the constant revision of the system (1971).

Silvern may overstate the degree to which educational phenomena can be controlled. The elements of education are not identical to those of a mechanical system. Mechanical systems contain only deductive logical relations between parts, whereas education is not characterizable totally as a logical system. However, rigorous logic ought to be applied in education whenever possible.

Gibson (1968) has systematized decision-making in schools through a chart of the tension and interaction of value systems and knowledge systems. These systems determine the priority of outcomes which feed into a decision system. Within the decision system is a control system which flows into an action system, though the control system is regulated by a monitoring system that is susceptible to feedback information from what Gibson calls the particular event system, this being the action system determined by the decision.

Stewart and Winborn (1973) have developed a general model for decision making in counseling based on the LOGOS language developed by Silvern. The model is an open system with twelve well-developed subsystems. Each major subsystem contains information relevant to decision making, this information itself being part of a minor subsystem.

One of the claims made for the model is that it forces the counsellor to be systematic; i.e., to adopt uniform procedures that enable him to evaluate and modify his practices.

There are several other well known models for counseling and they all share similar features. H. B. Gelatt's "Sequential Decision-Making Process," (1962) shares Gibson's idea of a value system, which reacts with a prediction system and a criteria system for the evaluation and selection of decisions (these latter systems embody the knowledge system of Gibson). Strategy has a central role in Gelatt's three systems. Gelatt depicts two stages of decisions: an investigatory decision feeds back into the strategy system via methods of investigation and data analysis; a terminal decision leads to an outcome.

Stufflebeam's (1966) evaluation schema has Values, Options, and Information (data) feeding into a Decision-maker which determines in turn Choice, Altered action, and Educational improvement. Since Stufflebeam's model is a rationale rather than a critical path analysis, it does not show loops of feedback though it is easy to envision their application to the model.

Another model of note is Marcus's "Organizational Decision Model" (1967) which has three stages of refinement. At the first stage the decision maker defines an approximate goal or aspiration level and maps certain strategies relevant to its attainment. At stage two, alternative strategies are evaluated and their outcomes determined in a loose way. In stage three the outcomes are compared with the initial aspiration level to achieve what is called an optimal solution (a satisfactory conjunction of outcome and aspiration). If the outcomes

exceed the aspirations, the level of aspiration is increased. If they fall short of the aspiration, then the outcome is fed back into stage two to be modified accordingly.

Barbee's A Systems Approach to Community College Education (1972) is a work that is important to this project. Unlike the systems noted in the foregoing analysis, Barbee's system incorporates the whole community college. Barbee urges community college educators to adopt a systematic approach to their task by taking into account the inputs which react systematically in the total system. The community college, as a system, reacts with other systems outside the college: consumers, the community, government, organizations, other educational systems, supporting technology, and the discipline areas. Within the community college system are the major systems of Instruction, Management, Administrative support and Policy. The chief system is Instruction. These systems receive input from some of the outside systems (e.g. the Instructional System receives input from Supporting Technologies and Educational Institutions). The four major internal systems contain minor systems. The minor systems interact within the major system and contribute input and receive output from other major and minor systems. The Instructional system, for example, has the minor systems of Students, Guidance, Curriculum and Instruction. These minor systems contain lesser subsystems.

Barbee's model of the community college system is quite complex but it does show the dynamic nature of the community college and particularly the need for precision in determining the results of any actions or decisions made in any small area, i.e., a subsystem.

Barbee's model emphasizes the need for specifying very clear objectives, particularly in the Instructional System. Clear objectives enable exact evaluation, measurement of effectiveness, and formulation of cost elements.

The decision-making model of Borgen and Davis (1971) is intended to be a systems approach to curriculum development and evaluation for occupational education in two-year colleges. This model begins with the specification of outcomes, proceeds to the establishment of objectives from whence the process continues through the ranking of objectives, defining the problem, identifying the problems, developing alternate solutions, establishing criteria (marked "high", "low" or "optimum"), collecting of data, evaluating alternatives, making a decision based on objectives, exploring consequences of the decision, and implementing the decision. From the implementation base there is feedback to a box for evaluation of the decision and the making of necessary changes; this in turn feeds back into the initial establishing of objectives area. This model (essentially a simple flow chart) bears a general appearance to a typical evaluation schema and exhibits a low level of systems interaction.

Relationship to this Project

There are many other models which could be cited, but the intention here has been to give a general guide to the benefits and constraints of models and systems, and to give a general idea of the broad features of typical models and systems.

This project has developed a decision making system which shares features common to most models and systems, namely the: conception of a process (such as decision making) as a dynamic state of change, this change being affected through feedback (and feed forward) of information in a systematic way; the conception of certain areas having systematic relationships with one another and as part of larger systems, hence as containing more than the apparently superficial relationships; and perhaps most basically, the conception of processes of decision, choice, judgment, etc. as being susceptible to a simple representation with an attempt to exhaustively describe the possible inputs.

If any model has been influential in the development of the project system, it would be a general evaluation model. The main feature of the project system is the form in which evaluation type questions are asked. The inclusion of assessment, judgment, strategy, etc. points to decision-making based on the evaluation of alternatives. The network of the precision subsystems is strongly influenced by evaluation procedures where criteria are determined prior to factfinding. The project system can be seen as a large evaluation model of present decision-making practices; its intent, however, is to recommend a certain path for decision-making based on the assessment by each college of each relevant input.

PART TWO

INTRODUCTION OF A NEW SYSTEM

In the last thirty years, many words have been written about occupational program development in community colleges. Unfortunately, the abundance of words has not been matched by improvements in the development process. The process is essentially the same today as it was in the 1940's: Someone gets an idea for a program. He or she meets with representatives of local business. They discuss the needs of business and plan a program to meet those needs. The representatives of business become an advisory committee. A community survey is conducted. Ultimately a program proposal emerges for approval by the college and the state board.

This process of program development has been historically important to community colleges. It has encouraged communication between the college and the community. It has created programs that fit the needs of students and the community. Thus, this process has helped fulfill the promise of the "community" college.

But the historical process does not meet the needs of modern community colleges. It lacks comprehensiveness and order. The historical process does not guarantee that all of the important questions are asked. Does the program fit the philosophy of the college? Will it be supported by the staff? Does this program overlap the programs of local and regional agencies? The present process may

enable all the relevant questions to be asked but there is no guarantee that the questions will emerge. If they do emerge, they emerge haphazardly. A question on students may be asked here, a question on employment there. The questions, and thus their accompanying decisions, emerge in no systematic order.

Recent attempts to systematize the program development process have not been very helpful. These systems have been written at an abstract level. They have not systematized the reality of occupational program development - the real questions, the conflicting priorities, the tough decisions. The systems have been pure in theory and, thus, immune to criticism and generally unusable by community college educators.

A good system for program development must overcome both the haphazardness of the traditional decision process and the abstractness of the new "systems". It must be based in the reality of community colleges but it must try to order that reality in logical ways. A good system blends reality and theory for the improvement of the development process.

The system from this project includes the parameters of theory and reality. Theory delineates the methodology of the system. Reality provides the content.

The methodology of this system is developed from the work of theorists in educational evaluation. The decision areas are displayed in a model which shows their relationships. The model shows a logical flow of questions, information and decisions. Criteria are established, facts are determined and judgments are made. This flow is consistent throughout the system.

The content of the system emerges from State University of New York (SUNY) requirements for academic program proposals. The system covers two decisions which are required by the state before a program is approved. The first, an estimation decision, is whether the program should be investigated. A positive decision culminates in a Letter of Intent to SUNY. The second, a precision decision, is whether the program should be adopted. A positive decision culminates in a program proposal to SUNY.

The State University of New York has specified that academic program proposals include six categories of information: identity, long range planning, resources, students, local resolutions and evaluation. The system from this project includes these six categories and a seventh, employment, which is a direct concern in occupational program development.

This system mixes theory and practical needs. Systems theory is blended with SUNY requirements for program proposals. The blend may result in a usable and helpful tool for community college educators.

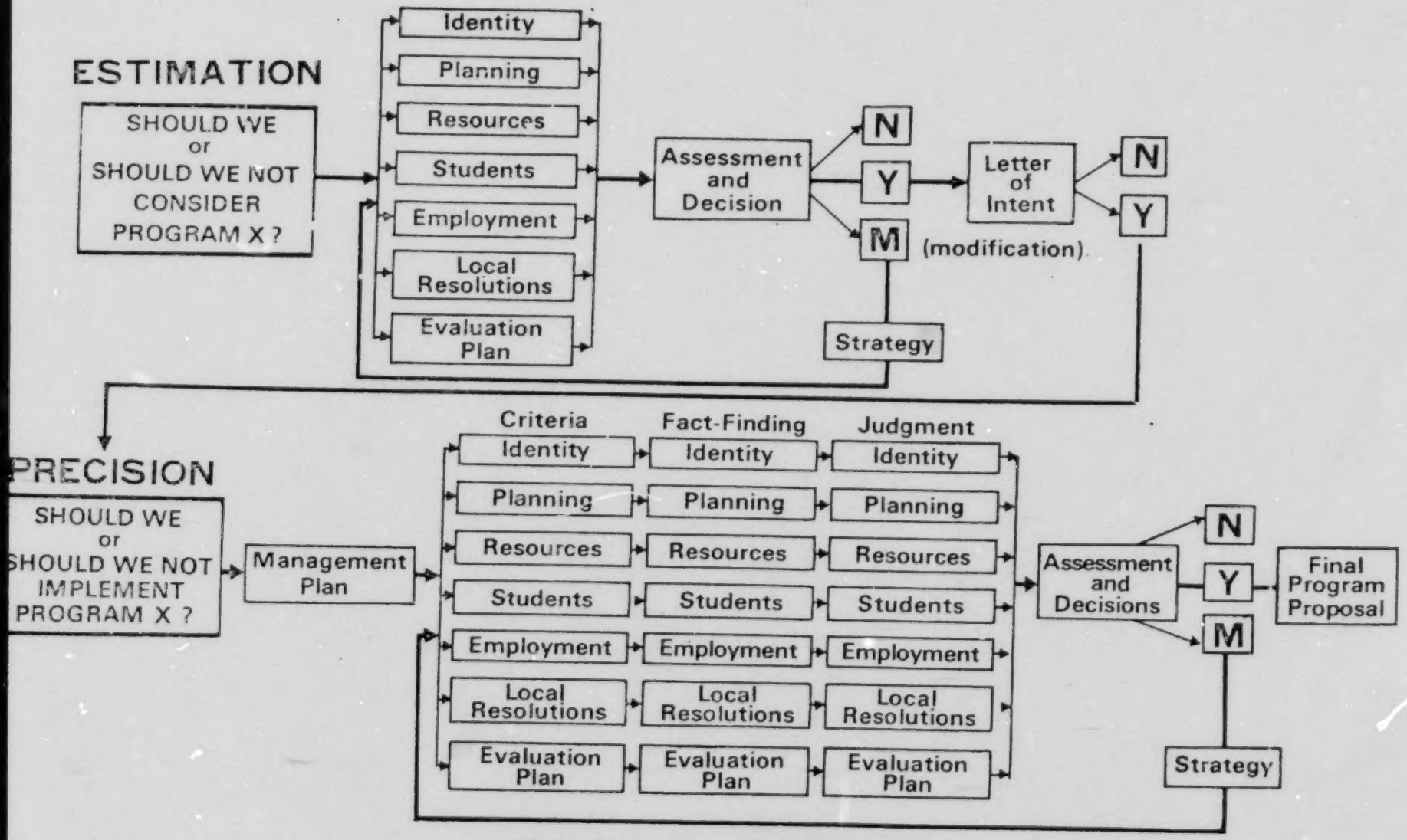
The primary purpose of the system is to help community college educators plan occupational programs. At least two uses of the system are possible in planning. An obvious use is at the college for which the program is planned. Another use of the system is to analyze successful programs at other community colleges. The system can help the educator understand the operation of a successful program of the type in which he is interested.

Other purposes and uses of the system may appear to the reader. The system could serve as an in-service education device for

faculty. Curriculum committees could use it as the basis of their operations. College staff could analyze existing programs through the system. The potential uses of the system are many and varied.

The chart that follows is the schematic representation, the model, of the system. The estimation and precision decision processes are displayed. So are the content categories for the decisions. The precision decision shows the establishment of criteria, the gathering of facts, and judgments in each of the content categories. The judgments are summarized for the final decision concerning the adoption of the program.

The reader may notice that the content categories are placed in a general but not mandatory order of priority. Arrows do not fix the connections between the subsystems. This arrangement is intended to provide the program initiator with as comprehensive but flexible a system as possible. The system enables an initiator from college A to gather employment information first. The initiator from college B may desire resources information first. The priorities of institutions differ and this system recognizes and respects those differences.



SYSTEM MODEL

DESCRIPTION OF THE SYSTEM

The general framework for the decision system is divided into two phases: the estimation phase and the precision phase. The former is devoted to a preliminary exploration of whether or not the program should be considered. The latter consists of a rigorous and detailed investigation of whether or not the program should be implemented.

The estimation phase begins as the program planner (who may be a Dean of Instruction, a President, or a Faculty Curriculum Committee) poses the question, "Should we or should we not initiate consideration of Program X?" He then considers basic questions in each of the major decision areas. Tentative answers to these questions are received on the basis of an informal investigation which is not costly in terms of time or resources. The decision-maker assesses the responses and makes a decision as to whether or not he wishes to devote the resources of the college to a rigorous and thorough investigation of whether or not the program should be implemented. If the answer is "yes", he sends a Letter of Intent to SUNY. If not, he may engage in "strategy" to readjust the nature or content of the program in order to elicit more positive responses or he may simply discontinue consideration of the program.

If the response to the Letter of Intent is negative, two courses of action are open to the college. The program may be abandoned or it may be revised in the light of the reaction from SUNY and a new Letter of Intent submitted. If the response from SUNY is favorable, then the program planner proceeds to the precision stage.

It should be emphasized here that adequate projections of manpower demand and student enrollment, as well as the careful development of a program and an assessment of its resource requirements cannot be done by casual questioning. If it is to be done well, it will be costly in terms of time and money. Yet, if it is not done well, it will be even more costly in terms of misallocations of resources and the consequent waste of the taxpayer's money. Thus a distinction is made between the two phases of the decision-making process. The "estimation phase" is devoted to consideration of whether or not the scarce resources of the college should be used to explore the possibility of initiating Program X. The "precision phase" is devoted to a detailed analysis of the various decision areas impinging on the problem of whether Program X should be implemented.

At the beginning of the "precision phase" the decision-maker outlines the methods he will use in planning the necessary research and then briefly sets out the basic idea of the program. He then proceeds through the sub-systems which are designed to encompass the various decision areas related to the proposed program.

Each subsystem (employment, students, identity, resources, planning, local resolutions, and evaluation) is divided into three component parts. In the first part criteria for acceptability are established. In the second part, described as "fact-finding", research relevant to the question of whether or not Program X should be initiated is carried out. In the third part, a judgment is made about the relationship between the established criteria and the results of the fact-finding. An example of this process would be:

	CRITERIA	FACT-FINDING	JUDGMENT
Question	How many FTE's will the program need to be financially viable?	How many FTE's can the program reasonably be expected to attract?	What is the relationship between the criteria and the results of the fact-finding?
Answer	20	10	Unacceptable

After the judgments on each question within the subsystem have been made a more general set of judgments is made on the acceptability of the results of each subsystem. A detailed description of the program will also have emerged from the subsystems. On the basis of the final program descriptions and the judgments, an assessment will be made of the overall desirability of the program and a decision will be reached on whether or not to initiate the program.

As in the "estimation phase", there are three possible answers to the final question: yes, no, and re-cycle. In the latter case the planner engages in "strategy" to adjust the nature of the program or the way in which it is taught to see if he can obtain acceptable results.

ESTIMATION PHASE

INTRODUCTION

Prior to this phase, a program idea has been proposed to the decision-maker. He or she is faced at this time with two basic decisions: 1) Should time and resources be committed to the investigation of the program idea? and 2) Does the program idea warrant the submission of a Letter of Intent to the State University administration?

To assist decision-making, a general question is listed under each of several decision areas (subsystems). These questions guide the decision-maker in informal data-gathering procedures. Answers to the questions in the estimation phase should be obtained with a minimum expenditure of effort, consistent with obtaining a reliable estimate. The experience and personal contacts of the decision-maker should be utilized fully in this phase.

Negative answers to the questions can lead to dropping the program idea or modifying it in some way to make it acceptable.

Affirmative answers to the questions lead to the submission of a Letter of Intent to the State University. The letter requests approval to proceed with the development of a program proposal, through engaging in the precision phase of the decision-making process.

QUESTIONS

Employment Possibilities

Will the graduates of the program be able to obtain jobs commensurate with their training?

Students

Will the program be able to attract sufficient students to make it financially viable?

Identity of the Program

What will be the general content of the program?

Resources

Does the college have the resources necessary to carry out the program?

Planning

Is the program in accord with the SUNY Master Plan and the Campus Master Plan?

Local Resolutions

Is there support for the program among faculty, students, administration, potential employers, and the community?

PRECISION PHASE

INTRODUCTION

When the college receives an affirmative reply to the Letter of Intent, the decision-maker proceeds with a rigorous investigation of the proposed program, the precision phase of the decision-making process. The outcome of the precision phase is: (1) a complete program proposal including a detailed program description and all supporting information; or (2) a decision to modify some aspect of the proposed program to make it more acceptable; or (3) a decision that some aspects of the proposed program are unacceptable, therefore, the program will not be considered further.

The purpose of the precision phase is to gather information pertaining to each decision area (subsystem) of the major decision of whether or not to proceed with a program proposal. The subsystems, and questions within them, define guidelines for the decision-maker. If the guidelines are used intelligently, with appropriate modifications and additions for a particular situation, the probability of an appropriate decision will be maximized.

Managing the Precision Phase

Perhaps the crucial problem for the decision-maker is detailing an adequate management plan for the precision phase. The initial problem is whether to follow an "open-front" or a "solid-front" planning procedure. The open-front procedure is not the typical method of curriculum planning in the two-year college, but it has several virtues. Using this approach, parts of the proposed program -- perhaps a course or two, or a field work component -- would be implemented immediately.

In short, open-front planning calls for starting in a very small way and growing with success. Evaluation is conducted at each step. At the point where a major commitment of resources is required, a considerable body of data is available to complete the precision phase. The open-front procedure requires an elongated time-frame to complete planning, and it may not be appropriate for curricular programs which must meet a set of external standards such as certification requirements.

Solid-front planning, more common in the two-year colleges, requires that all planning procedures for the program be completed prior to the implementation of any aspect of the program. The main problem with a solid-front approach is that the consequences of a planning mistake are much more significant than in an open-front approach.

The precision phase could be utilized as a decision-making guide with either an open-front or solid-front approach. However, its expected use is with a solid-front procedure.

Interaction Between the Subsystems

The subsystems have been arranged in a general order of priorities. The identity of the proposed program provides definition for the other subsystems. For example, an evaluation plan must be based on the parameters of the identity of the program. Likewise, the resources subsystem provides information on minimum enrollment figures for the students subsystem which, in turn, provides an estimate of the number of graduates for the employment subsystem.

Many of the interactions between subsystems are not so obvious, however. Subtle interactions occur between the subsystems. For example, funding resources may modify the identity of the program. This interaction between subsystems makes the planning process self-corrective to a large extent, building in a modification strategy during the precision phase.

It would be too complicated to chart all of the possible interactions between subsystems. Thus, the model of the decision-making system has been presented in the simplest linear form.

METHODS OF PLANNING

Type of Planning

1. Will the planning be "open front", i.e., will a pilot program be used before the total program is approved or rejected?

2. Will the planning be "solid front", i.e., will the decision to accept or reject the program be made before parts of the program are tested?

Personnel

1. Who will have primary responsibility for conducting and coordinating the research?

2. What role will institutional staff have in the research for each of the subsystems, e.g., faculty, director of institutional research, academic dean, curriculum committees, etc.?

3. Will new personnel be employed to do the research, e.g., through obtaining a grant for the research?

4. How will the implementers of the proposed program be involved in the planning for it?

5. What role will community groups, e.g., potential employers, have in the research for each of the subsystems?

Resources

1. What financial resources are available at the college for the research?

2. Will money be requested from outside agencies to sponsor the research?

3. Will the primary researcher and/or others be compensated for their efforts? How?

4. Will the primary researcher and/or others be released from other duties in order to do the research? How will those duties be fulfilled?

Methodology

1. Who will determine the criteria in each subsystem?

2. What are the priorities of importance of the subsystems to the proposed program or to the situation of the college?

3. What are the deadlines for research information to be gathered in each of the subsystems?

4. What methods of data collection are to be considered for use in the research of the subsystems, e.g., observational devices, questionnaires, phone surveys, etc.?

5. How will information be shared when it is important to the development of more than one subsystem?

Approval

1. What personnel or groups will have the power to approve or disapprove the proposed program, e.g., curriculum committees, dean of instruction, president, faculty association?

2. When will each of these personnel or groups be involved in the approval process?

3. What concerns are most important to each of the personnel or groups, e.g., identity to the curriculum committee?

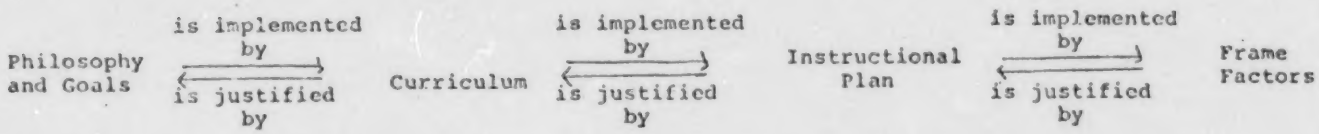
SUBSYSTEMS

Identity

Introduction

The identity subsystem is concerned with two major questions: a) what should constitute the program of studies and b) what does constitute the program of studies. The first is the major criterion question and the second is the major fact-finding question for this subsystem. In order to break down each of these major questions into subordinate questions, four program elements need be considered: 1) the philosophy and goals (i.e., the rationale for the program), 2) the curriculum (i.e., what is to be learned), 3) the instructional plan (i.e., the teaching strategy), and 4) the frame factors (i.e., the physical, personnel and administrative constraints and influences).

One may think of these four elements in a means-end continuum as follows:



——→ answers question "how?"

←—— answers question "Why?"

Criterion Questions

Philosophy and Goals

1. What personal-social needs of the student should the program be designed to meet?

2. What community needs should the program be designed to meet?

3. What career development needs of the student should the program be designed to meet?

4. What relative priority should be assigned in the program to the personal-social development of the individual, to the development and improvement of the community, and to the career development of individuals?

5. For what tasks within the occupation is training useful and necessary?

6. For which of these tasks is on-the-job training inappropriate?

7. For what occupational tasks should training be provided?

8. What general education goals complement the occupational training?

9. What general education goals are desirable for all students in the light of their personal-social well-being? In the light of the community's well-being?

10. To what extent should the program provide for the occupational mobility of its graduates?

11. What general education goals should be provided for in the program?

Curriculum

12. Should the program meet accreditation criteria of any institution or organization?

13. Should the graduates of the program be prepared to pass certification tests?

14. Should the graduates of the program be prepared to pass tests for entry into any occupations?

15. What are the major areas of substantive content that need to be learned in the program?

16. What are the major types of competencies that need to be learned in the program?

17. What attitudes/values need to be learned in the program?

18. What types of courses need to be offered in the program?

19. Are there any specific courses that should be required?

20. Are there any specific courses that should be elective?

21. What kinds of information should be considered prerequisite to the program?

22. What thinking (i.e., cognitive) skills should be considered prerequisite to the program?

23. What attitudes should be considered prerequisite to the program?

24. What motor skills should be considered prerequisite to the program?

25. What general aptitudes and abilities should be considered prerequisite to the program?

26. What remedial work should be offered to incoming students?

27. What indicators of learning should be used to determine the students' success?

Instructional Plan

28. What general teaching strategies should be utilized to cover the major areas of substantive content (see #15)?

29. What general teaching strategies should be utilized to develop the major types of competencies (see #16)?

30. What general teaching strategies should be utilized to instill or develop the desirable attitudes/values (see #17)?

    Examples of teaching strategies (for numbers 28-30 above) include: Lab or practicum; field experience, internship or cooperative education; independent study or tutorial; programmed instruction; discussion; lecture.

31. Are there any particular specific experiences students should have in the program?

Frame Factors

32. What space facilities are required for these teaching strategies?

33. What equipment and materials are required for these teaching strategies?

34. What transportation needs does this program have?

35. What is the minimum time required to complete this program?

36. What kinds of intact blocks of time are necessary in the scheduling of this program (see #28-31)?

37. What educational, personal, and work qualifications must the faculty have?

38. What is the minimum faculty-student ratio necessary for this program?

39. What is the maximum class size possible for implementing these teaching strategies?

40. What provisions should be made for team teachings?

Fact-Finding Questions

Philosophy and Goals

1. What personal-social needs of the student is the program designed to meet?

2. What community needs is the program designed to meet?

3. What career development needs of the student is the program designed to meet?

4. What relative priority is assigned in the program to the personal-social development of the individual, to the development and improvement of the community, and to the career development of individuals.

5-7. For what occupational tasks is training provided?

8-11. What general education goals are in the program?

Curriculum

12. Does the program meet accreditation criteria of the appropriate institution or organization?

13. Will the graduates of the program be prepared to pass the appropriate certification tests?

14. Will the graduates of the program be prepared to pass tests for entry in the occupations?

15. What are the major areas of substantive content that will be taught in the program?

16. What are the major types of competencies that will be taught in the program?

17. What attitudes/values will be taught in the program?

18. What types of courses will be offered in the program?

19. Are there any specific courses that will be required?

20. Are there any specific courses that will be elective?

21. What kinds of information will be considered prerequisite to the program?

22. What thinking (i.e., cognitive) skills will be considered prerequisite to the program?

23. What attitudes will be considered prerequisite to the program?

24. What motor skills will be considered prerequisite to the program?

25. What general aptitudes and abilities will be considered prerequisite to the program?

26. What remedial work will be offered to incoming students?

27. What indicators of learning will be used to determine the students' success?

Instructional Plan

28. What general teaching strategies will be utilized to cover the major areas of substantive content (see #15)?

29. What general teaching strategies will be utilized to develop the major types of competencies (see #16)?

30. What general teaching strategies will be utilized to instill or develop the desirable attitudes/values (see #17)?

    Examples of teaching strategies (for numbers 28-30 above) include: Lab or practicum; field experience, internship or cooperative education; independent study or tutorial; programmed instruction; discussion; lecture.

31. Are there any particular specific experiences students will have in the program?

Frame Factors

32. What space facilities will be provided for this program?

33. What equipment and materials will be provided for this program?

34. What transporation provisions does this program have?

35. What is the minimum time that will be provided for students to complete this program?

36. What kinds of intact blocks of time will be provided in the scheduling of this program?

37. What educational, personal, and work qualifications will the faculty have?

38. What faculty-student ratio will be maintained for this program?

39. What is the expected range of class size for this program?

40. What provisions have been made for team teaching?

Discussion

In answering the identity subsystem questions, it is best (although not necessary) to start with question #1 and proceed sequentially through to question #40. This recommendation stems from the relationships between the philosophy and the curriculum, the curriculum and the instructional plan, and the instructional plan and the frame factors. That is, the answers to the philosophy questions provide a basis for making curriculum decisions. Once curriculum decisions are made, instructional decisions can be made. Finally, decisions regarding physical personnel and administrative factors (frame factors) can be based on instructional requirements.

Furthermore, within any one section of this subsystem (e.g., philosophy and goals) the questions are best answered in sequential order also. For example, it is difficult to answer question #7 without answering #5 and #6 first. The same relationship applies to #8-11, #11 being dependent on answers to #'s 8, 9 and 10.

When answering the identity questions, the need will arise to consult answers to questions from other subsystems. For example, the frame factor questions need to be answered not only on the basis of instructional requirements but also on the basis of availability of resources (physical, people and financial). A recommended procedure here is as follows: a) use answers to the instructional planning questions (#'s 28-31) to answer the criterion frame factor questions; that is, the desirable teaching strategies will determine what resources are needed. b) Then use answers from the resources subsystem to answer the fact-finding frame factor

questions; that is, the availability of resources will determine what physical, personnel, and administrative constraints will be in effect.

A similar interaction between subsystems applies to some of the curriculum questions. For example, questions 21-26 need to be answered with some knowledge of the type of students to be admitted (i.e., from student subsystem). If students are to be screened, then the prerequisite will serve as a criterion in screening. If screening is undesirable, then knowledge of the average student's background (in terms of information, thinking skills, attitudes, motor skills and general abilities) could be checked against prerequisites for the program (#'s 21-25) and either remedial course work could be designed or the assumed prerequisites could be re-evaluated. At any rate, #21-26 obviously need to be answered in conjunction with questions from the student subsystem.

Long Range Planning

Introduction

The planning subsystem seeks to establish a "goodness of fit" comparison between the proposed program and the state, regional, and local college plans. Questions are directed to assess the program's independence or complementarity with existing and projected programs and/or the proposed program's duplication of current or projected programs. Emphasis is on short and long term present planning rather than on futuristic planning of what "might be".

Criterion Questions

State Level

1 - 2. a) Is the program specifically encouraged in the SUNY Master Plan?
b) Is the program specifically forbidden in the Master Plan?

3. a) Is the program specifically encouraged in the area's occupational Regional Planning Council plan?
b) Is the program specifically forbidden in the Regional Planning Council plan?

College Level

4. a) Is the program specifically encouraged in the Statement of the Purposes and Objectives of the college?
b) Is the program specifically forbidden by the Statement of the Purposes and Objectives of the college?

5. a) Is the program specifically allowed in the legal authorization of the college?
b) Is the program specifically forbidden in the legal authorization of the college?

6. a) Should the program complement existing programs of the college?
b) Should the program be independent?

7. a) Should the program complement projected vocational programs of the college?
   b) Should the program be independent?

Local Level

8. a) Should the program complement vocational programs offered by other institutions (public or private) in the area from which the college draws its students?
   b) Should it be independent?

9. Is it appropriate for the program to duplicate an existing vocational program (public or private) in the area from which the college draws its students?

Fact-Finding Questions

State Level

1. Is the program consistent with the University SUNY Master Plan?

2. Is the program consistent with the Regional Master Plan?

3. Is the program consistent with the area's occupational Regional Council plan?

College Level

4. Is the program in keeping with the purposes and objectives of the college?

5. Does the program fall within the boundaries of what the college is legally authorized to do?

6. How does the program relate to other existing programs of the college?

7. How does the program relate to other projected programs of the college?

Local Level

8. How does the program relate to existing vocational programs in the student-draw area of the college?

9. Will the program duplicate an existing vocational program in the student-draw area?

Discussion

Responses to the long range planning subsystem questions provide a base for an early tentative indication of the proposed program's viability. The subsystem will identify those planning conflict points between the State Education Department, State University of New York, Board of Cooperative Educational Services, proprietary and public schools. The conflict will be identified particularly as the conflict points are related to duplication of programs in the student-draw area. However, if the proposed program has positive indication of "goodness of fit" with state, regional and local plans, major institutional/organizational barriers to its existence will be absent.

Resources

Introduction

The resources subsystem is a material translation of the identity of the program. Ideas about instructional needs are translated into the dollars and cents requirements of the program. Thus, the facts of the identity subsystem establish, essentially, the criterion cost questions of the resources subsystem. The resource fact-finding questions concern the amount of revenue which is available to meet the criterion costs.

Criterion Questions

Personnel Costs

1. What is the minimum acceptable cost of new and/or shared faculty services for the program?
2. What is the minimum acceptable cost of new and/or shared administrative services?
3. What is the minimum acceptable cost of new and/or shared clerical services?
4. What is the minimum acceptable cost of new and/or shared other services, e.g. counseling and placement?

Facilities-Operating Costs

1. What is the minimum acceptable cost of operating equipment, e.g. stenographic materials, library materials, etc.?
2. What is the minimum acceptable cost of maintaining shared housing for the program?
3. What is the minimum acceptable cost for transportation services?

Facilities-Capital Costs

1. What is the minimum acceptable cost of new space and buildings for housing the program? Initial cost? Long-range cost?

2. What is the minimum acceptable cost of new capital equipment for the program, e.g. furniture, lathes, etc.? Initial cost? Long-range cost?

Fact-Finding Questions

External Revenue

1. Has a grant been obtained for the program? What costs does it cover?

2. What special state or federal funds are available to defray capital expenses for the program? Initial impact? Long-range?

3. What special local funds are available to defray capital and operating expenses? Are new bond issues feasible?

4. What outside facilities can be used to defray costs for the program, e.g. industry laboratories?

Internal Revenue

1. Is revenue available for the program through the reduction or dropping of an existing program?

2. What is the revenue per FTE/student at the college? From the state? local resources? tuition?

3. Does the program draw additional state or federal support because it is oriented to a particular group of students? What is the special revenue per student?

Discussion

If a program shows a large amount of capital costs, the planner may wish to answer the cost and revenue questions twice. First, he might examine the initial costs of the program. Then, he might compare those costs with the costs over a five-year period. Initial revenue and

long-term revenue could be matched with the costs. Then the planner could see whether cost-revenue discrepancies occurred initially or throughout the operation of a program. He might seek long-term funds to defray large capital costs at the start of the program. The five-year approach provides perspective for the planner of a program.

By adding the separate costs for a program, the planner has a total number for the minimum acceptable costs. From this number, he can subtract the external revenue to determine the costs that must be defrayed by internal revenue. The planner subtracts revenue from changes in existing programs to determine the costs that must be covered by per student/FTE revenue. He adds the special revenue, if any, to the regular student/FTE revenue. Then he divides the cost figure by the revenue figure to determine the number of students who are needed to make the program self-sufficient. This number enables the planner to initiate investigation in the students subsystem. An example follows:

A.	Total costs	$1,800,000	
	- External revenue	1,500,000	
	Costs to be covered by internal revenue	300,000	
	- revenue from changes in existing programs	0	
	Costs to be covered by FTE revenue	300,000	
B.	per regular student/FTE revenue		1,000
	+ per special student/FTE revenue		500
	total revenue per program student/FTE		1,500

C. (from B) 1,500 ⟌ 300,000 (from A) — 200

This program must attract 200 of the students for whom it is oriented in order to become self-sufficient.

Students

Introduction

This subsystem provides a framework for projecting enrollments, attrition, completion rates, and student characteristics for the proposed program. The estimated minimum enrollment required for a financially successful program is obtained from the resources subsystem and forms the basic estimation problem for this subsystem.

Criterion Questions

1) What is the minimum acceptable level of enrollment? (From resources subsystem).

2) (a) Is it necessary for the program to attract students from other counties in order to be financially viable?

   (b) Have regional arrangements to exchange students with other colleges been explored?

3) Will the program be designed to serve part-time or full-time students? Is the part-time enrollment significant to planning?

4-12) What methods of student recruitment would be best suited to the proposed program? Have these methods been used to estimate probable student enrollment?

13) Should the program be directed to a specific student clientele? If so, what are the consequences, e.g. financial consequences, affirmative action, etc.

14) What special counseling provisions should be made for the program?

15) What special placement provisions should be made for the program?

16) Is articulation with existing high school or BOCES programs necessary or desirable?

17) Is articulation with four-year college programs necessary or desirable?

18) What special provisions are necessary in the design of the program (remedial, etc.) to accommodate the learning characteristics of predicted enrolling students?

19) Is the existence of special financial aid (Federal, State or Private) for students in the program an important factor in the decision of whether or not to implement the program?

Fact-Finding Questions

1) What is the expected full-time student enrollment in the program?

   a) Will the minimum enrollment requirement for the program in each year be met?

   b) What is the maximum probable enrollment in the program in each year?

   c) How many internal transfers into and from the program will occur?

   d) What is the expected attrition rate by dropping out of college or failing the program?

TABLE I

Period	Minimum expected enrollment	Maximum expected enrollment	Internal transfers In	Internal transfers Out	Probable attrition	Probable graduates
Year 1	Freshmen					
	Sophomores					
Year 2	Freshmen					
	Sophomores					
Year 3	Freshmen					
	Sophomores					

2) a) How many students will the program attract from other geographical areas?

   b) How many students and for which parts of the program might be expected from other colleges?

3) What is the expected number of part-time students (See question 13)?

4) How many current high school juniors and seniors in the area have demonstrated interest in the program?

5) How reliable has information from these particular high schools been in the past?

6) Is there any reason to believe that the reliability of this year's estimate will be different from estimates made in previous years? If so, how much?

7) What discount figure (if any) should be applied to the stated figures of interest?

8) Has the non-high school public been informed of the proposed program?

9) What method has been used to inform the non-high school public?
Advertising in:
- local newspapers?
- local radio and TV stations?
- local industries?
- supermarkets/shopping centers?
- public transportation?
- community centers?
- civic/community service organizations?
- places of entertainment?
- other?

10) Has any method of feedback from local advertising been provided for?
- postcards?
- newspaper clips?
- telephone calls?
- requests for catalogues?
- application forms?
- other?

11) On the basis of past experience, what discount factor (if any) should be applied to the feedback from local advertising?

12) Is there any reason to believe that a different discount factor should be applied this year? If so, what?

13) Will the program serve a special student clientele?
- disadvantaged?
- handicapped?
- veterans?
- aged?
- mid-career change?
- male/female?

14) Based on a study of all available planning data, what special provisions will the counseling staff make for students in the program?

15) Based on a study of all available planning data, what special provisions will the placement officer make for graduates of the program?

16) How will the program articulate with existing high school or BOCES programs?

17) How will the program articulate with four-year college programs?

18) From a comparison of the predicted demographic characteristics will entering students have significantly different academic or personal characteristics than currently enrolled students?

19) What special financial aid (Federal, State or Private) exists for students in this field?

Discussion

In one sense an educational program has no "consumer demand" characteristics because it is purely instrumental to specific goals of prospective students. In addition, the time lag between planning for a program and the actual implementation of that program means the planner may be working with a prospective student population comprised of completely different individuals than the population from which the program will actually draw students. This makes the collection of reliable projected enrollment data a difficult task.

For these reasons the most useful information in achieving reliable estimates for the students subsystem will probably be population characteristics and trends for the region served by the college and experience factors derived from past enrollment in the most similar programs at the college. Additional general considerations would be such factors as the probability of drawing students from a new segment of the population which has not previously participated in the college's programs, the general economic trends in the region, and new competition factors either from other new programs in the college or from other educational institutions.

In any case the most important question involves an assurance that the required minimum enrollment figures will be met.

The students subsystem will be of use in the actual recruitment of students prior to program implementation. Many of the questions define an aggressive recruiting posture, which seems perfectly appropriate once the decision to implement the proposed program has been made.

After an advertising/recruiting campaign has begun, enrollment projections can be successively refined with increased reliability for continued program planning and modification.

Employment

Introduction

Predicting future labor markets presents many difficulties. There are technical data collection and analysis problems, and there are worries concerning the validity of the assumptions which underly market projections. So substantial are these problems that there are those who doubt the worthwhileness of making projections at all - and who point to the errors made by market analysts. On the other hand, in the practical situation, educational planners are forced to make decisions which are based on expected job markets.

This subsystem helps educators form opinions about future labor markets. Market projection techniques are discussed even though labor markets cannot be predicted with 100% accuracy. The emphasis is on making sound judgments about the probabilities of market conditions.

Four key areas are discussed. (In a later section they are considered in greater depth.)

1. Market delineation

A labor market must be defined in terms of both the geographical region of interest and the occupational category (or categories) of interest. While most people specify a geographical region with reasonable clarity, not all are aware of the vagueness of many occupational titles. It is important to understand how job categories are formed for use in census and manpower data, to know whether local employers use terms in the same way, and to be able to relate a program to precise job categories.

Market delineation is not only a prerequisite for projecting future trends. It is also necessary for making decisions about the desirability of undertaking extensive market analyses.

2. Demand factors

Demand in a given market for a given year equals the number of job openings in that market and year. The number of job openings depends on growth rate and replacement rate. It is a common mistake to consider demand simply in terms of growth rate. Some industries (e.g. teaching) show relatively little change due to growth, but have very substantial demand due to replacements. Even declining industries need replacements.

3. Supply factors

The number of job openings does not, in itself, show how favorable the market will be for new graduates. One must also consider the number of applicants supplied by other sources (such as other colleges, promotions within industry, etc.).

4. Validation and promotion

Given some preliminary market estimates, one can check them against a variety of sources.

Furthermore, it is important to avoid the assumption that a market cannot be changed, (a good deal of modern business activity is directed specifically to influencing markets). Even if the preliminary projections are discouraging, a well-mounted promotion may radically alter the picture.

Finally, a reminder that this subsystem is intended to help planners make sound judgments. Statistical methods often help, but the misuse of such methods may produce misleading results.

Criterion Questions

1. For what occupational roles will the program prepare the student? (From Identity subsystem).

2. What is the expected geographical distribution of graduates seeking entry to the work force? How important are detailed local projections for establishing program viability?

3. Given the definition of the market of interest, what level of market estimation is required, i.e. How detailed should the market analysis be?

4. What minimum number of graduates must be able to find employment in the market of interest over a given period, assuming some will pursue further education or leave the region of interest?

5. To what extent should attempts be made to stimulate the market if initial projections are unfavorable, e.g. via program promotion, program modification?

Fact-finding Questions

1. What is the occupational delineation of the market of interest? (Note: This requires translation of program objectives into occupational categories, and thus depends on knowledge of data sources.)

2. What is the geographical boundary of the market of interest?

3. What facts are known about the market of interest? What future trends may reasonably be assumed?

4. What are the optimistic and pessimistic market projections? Which employers have indicated firm intention to employ graduates? How many per year? With what median and/or modal starting salaries? In what positions? With what promotional prospects?

5. What are the prospects for influencing the market? What promotional activities have been tried? With what results? Are there special impediments such as registration or health requirements? Could program changes open up a much wider market?

Discussion

It is helpful to consider labor market projections as developing through four stages, viz.

1. Identifying the market of interest.
2. Projecting demand.
3. Projecting supply.
4. Using 2 and 3 to form preliminary market estimate which is then subjected to a validation/promotion procedure.

These four stages will be discussed below. Major sources of data are identified and some procedural considerations and alternatives are highlighted. It is hoped that what follows will serve as a useful starting guide for readers with little or no background in labor market analysis.

1. Identifying the market of interest.

(a) Geographical region of interest.

Factors determining this region will be -

(i) The nature of the occupation and expected dispersion of graduates.

(ii) The region from which the college draws its support (in terms of student residence and political support).

It is expected that the geographical region of interest will usually be defined as (ii) above. The nature of the occupation, however, may influence one's assumptions about the percentage of graduates likely to remain in this region.

In addition, the college support region may not coincide with any New York State employment region. In this case consideration must also

be given to the market in nearby denser employment regions, and to the number of graduates who might be absorbed in such regions.

(b) Occupation of interest.

Some occupations are well-defined and relate closely to well-defined programs (e.g. inhalation therapy, registered nursing). On the other hand, there are occupational groupings with loose boundary conditions which admit people with quite varied backgrounds (e.g. many clerical occupations). In addition, some well-defined programs lead to somewhat diverse occupational possibilities (e.g. accounting).

(c) Market of interest.

Identifying the market of interest depends on establishing some region(s) of interest, and on establishing some occupational boundaries. The particular regional/occupational mix will determine, to a large extent, the ease or difficulty of making projections, and will also affect the worthwhileness of such an attempt.

In considering a program to train inhalation therapists, for example, market estimation would be important because in this case specific training is linked with a specific job. The employment prospects for graduates therefore depend heavily on a well-defined occupational market.

In considering a program to train accountants, on the other hand, since there exists a steady national demand for such people over a very wide cross-section of industries, the worthwhileness of detailed regional projections seems questionable. A sufficient guide to limiting enrollments in such a program could probably be gained by reducing national estimates on a simple population proportion basis.

2. Projecting demand.

Demand (i.e. number of job openings) depends on the rate of occupational growth and on the occupational replacement rate.

Replacement rate seldom changes dramatically, and provides some stability in future demand estimates. The importance of growth rate depends on its relationship to replacement rate. This point is elaborated in the following paragraph.

The greater the replacement rate relative to growth, the less effect errors in projecting growth will have on estimates of job openings. For example, suppose one wishes to estimate job openings over a ten-year period with no more than 10% error, for an occupation with an actual growth rate of 20%. Then if the replacement rate is 0.5% annually, an error of 13% in estimating growth will still keep the job-openings estimate within the required error limits. If the replacement rate is 6% annually, then an error as high as 40% in estimating growth rate will not lead to greater than 10% error in the job-openings estimate (see 12c, p. 4, 5, 10). Thus the seriousness of error in growth rate estimates depends on the ratio between growth rate and replacement rate.

The New York State Department of Labor (1, 2) provides regional job-opening estimates for more than 170 occupations. The U. S. Department of Labor (7) provides national estimates for 232 occupations. These sources are recommended for use when applicable. When these sources do not contain the required information, it may be necessary to estimate regional projections from national census data. A recommended approach (described in 12a) is to apply national industry/occupational ratios to regional industry estimates (which requires development of regional estimates as a first step). Having thus estimated change due to growth, occupational replacements must be added to form job-opening estimates.

3. Projecting supply.

Because of the paucity of data, very little of use has been published about occupational supply (see 7).

Three basic supply questions are -

(a) What proportion of job vacancies in the occupation (base year) was filled by new graduates?

(b) How many graduates are released from colleges to this market each year? (And what are the projected graduation rates in these colleges for the occupation of interest?)

(c) Could the ratio of new graduates to others gaining jobs in this occupation be changed?

The answer to (b) should in principle be easy to determine. Question (a), on the other hand, would seem to require extensive regional data collection efforts. If question (a) can be reliably answered, one can then ask (with (c)) -

* Does this pattern exist because too few graduates apply for such jobs?
* Do employers have misgivings about the kind of training offered or proposed? If so, what are the implications?
* Do employers properly understand the roles for which graduates may be fitted?
* How does/can the college contribute to the continuing education needs of members of the work force seeking promotion into this occupation?

* If the predicted occupational growth rate is high, how will this affect the employment for graduates? What changes in recruitment patterns and/or inservice training are industries likely to adopt? Will such changes improve or worsen the market for college graduates?

Thus, one needs not only to make supply projections, but to understand the factors which govern the supply situation. The latter is particularly important, since promotional activities are likely to be directed towards changing the pattern of supply in the market (i.e. attempting to improve graduates' standing in the market). The basic demand characteristics of a market are less easily influenced.

4. Estimating, validating, promoting.

Given some estimates of supply and demand, one can form opinions about the likely market from the base year up to the projected year. The longer the projection span, the less reliable the estimate will be. It is suggested that projections more than ten years beyond a base year are probably not worth making. U. S. Department of Labor has prepared a research report (12e) showing error rates in predictions over the 1950/1960 period using the prediction method recommended earlier in this outline (12a).

At this stage then, one is able to check an estimate against all possible sources and simultaneously engage in course promotion. This exercise would appear to be most valuable, regardless of the accuracy of the initial projections, since it provides a focus for dialogue with industry and an opportunity to influence market conditions.

It is recommended that placement personnel be included in this stage of endeavor (if not throughout) since it would enhance their access to relevant information and strengthen their contact with employers. For similar reasons, some teaching faculty may well be included.

In checking estimates with employers, it is important to consider:

(a) How well one's contact really understands his firm's future needs.

(b) How willing one's contact is to be frank.

(c) What contingencies might alter the opinion of one's contact.

With respect to (c), not only should the educator seek opinions about his estimates and about a firm's future needs, but he should also ask what factors are most influential in determining a firm's needs. What assumptions does the firm make in projecting future growth? What factors could substantially alter the picture?

Several sources can be used to check estimates:

* Business and professional associations.
* Labor unions.
* Planning authorities who may know of some important projected development.
* The market analyst in the nearest U.S. Department of Labor office.
* The local employment office (N.Y. State) for information based on employment insurance.

Finally, it might be possible to formulate an estimate in terms of "pessimistic" and "optimistic" projections based on varying market assumptions and error estimates. For example, predicted growth and replacement rates might be used to assess error risks in job-opening projections. Other market information (determined in supply and validation stages) may provide a reasonable basis for making "judgmental" adjustments to final upper and lower projections. Forming such "confidence intervals" would seem likely to aid decision-making.

REFERENCES

Abbreviations used:

USDOL . . .	U.S. Dept. of Labor
BOLS . . .	Bureau of Labor Statistics
MAP . . .	Manpower Administration Publication
NYSDOL . .	N.Y. State Dept. of Labor
DRS . . .	Dept. of Research and Statistics

1. NYSDOL, DRS: Manpower Requirements. Interim projections for N.Y. State 1968-80. July 1971

   A regional analysis, but input data somewhat dated.

2. NYSDOL: Comprehensive Manpower Plan. May 1973.

   Updated projections for major groupings.

3. NYSDOL: Manpower Review.) Manpower Trends.) Serials providing very general regional information.

4. U.S. Bureau of the Census, U.S. Census of Population: 1970. Subject Reports, Occupations by Industry.

5. USDOL, BOLS: College Educated Workers 1968-80 Bulletin 1676.

6. USDOL, MAP: Guide to Local Occupational Information. 4th Ed. 1973.

   Indicates information available from district offices.

7. USDOL, BOLS: Occupational Manpower and Training Needs. Bulletin 1701.

   Contents:

   Ch. I. How to use occupational demand and supply information in planning occupational programs. (Includes a section on the "local use of data".)
   Ch. II. Future projections.
   Ch. III. Occupational training and persons completing.
   Ch. IV. Summaries

8. USDOL, BOLS: Occupational Outlook Handbook, 1972-73 Edition. Bulletin 1700

   Published every other year, this handbook contains --

   (a) An account of some 800 occupations under the headings --
       Nature of the work
       Places of employment (including numerical estimates)
       Training, other qualifications and advancement
       Employment outlook
       Earnings and working conditions
       Sources of additional information
   (b) An account of occupational prospects in nine major industrial groupings.
   (c) A brief introductory section (Tomorrow's Jobs) providing some general perspectives.

(d) A very brief statement ("Technical Appendix") of procedures used to develop the Handbook.

9. USDOL, BOLS: Occupational Outlook for College Graduates. 1972-73 Edition. Bulletin 1730.

   A subset of the information in 8 above.

10. USDOL, BOLS: Occupational Outlook in Brief. Reprinted from Occupational Outlook Quarterly, 16 (1), 1972.

    A very brief summary of 8 above.

11. USDOL, BOLS: Occupational Outlook Quarterly.
    Supplements information in Occupational Outlook Handbook by providing interim reports between handbook editions.

12. USDOL, BOLS: Tomorrow's Manpower Needs.

    Five volumes concerned with the use of national manpower projections in developing State and area manpower projections.

    (a) Bulletin 1606 (Vol. I, Feb. 1969): Developing Area Manpower Projections.
    (b) Bulletin 1606 (Vol. II, Feb. 1969): National Trends and Outlook. Industry Employment and Occupational Structure.
    (c) Bulletin 1606 (Vol. III, Feb. 1969): National Trends and Outlook. Occupational Employment.
    (d) Bulletin 1737 (Vol. IV, Revised 1971): The National Industry and Occupational Matrix and Other Manpower Data. (The 1970 matrix in this report is preliminary and will be revised using 1970 census data.)
    (e) Bulletin 1769: Research Report on Manpower Projection Methods.

13. USDOL: Dictionary of Occupational Titles.

    Vols. I & II contain job classifications and definitions. Supplement lists individual physical demands, working conditions, and training time for each job defined in DOT.

Local Resolutions

Introduction

The local resolutions subsystem structures questions to identify college based support of the proposed program through the assessment of faculty, students and the program advisory committee. In addition, groups external to the college but closely allied with the program are identified and their approval, support and commitment are sought for program development.

Criterion Questions

College Support

1. What constitutes the minimum acceptable evidence of faculty* support for the program?
   (*faculty sponsor, administrative council, etc.)

2. What constitutes the minimum acceptable evidence of student* support for the program?
   (*currently enrolled at the college)

3. What constitutes the minimum acceptable evidence of potential student* support of the program?
   (*students not currently enrolled at the college)

4. What constitutes acceptable evidence of support from the Advisory Committee?

External Support

5. What constitutes the minimum acceptable evidence of approval from the required licensing boards (if any)?

6. What constitutes an acceptable level of commitment from potential employers to hire graduates of the program?

7. What constitutes an acceptable level of commitment from potential employers to help in the design and evaluation of the program?

8. What constitutes an acceptable level of commitment from potential employers to participate in a work-study project?

9. What additional evidence of local support for the program would be desirable (For example, unions, special agencies, community action programs, etc.)?

Fact-Finding Questions

College Support

1. What evidence of faculty* support for the program has been received?
   (*faculty sponsor, administrative council, etc.)

2. What evidence of student* support for the program has been received?
   (*students currently enrolled at the college)

3. What evidence of potential student* support for the program has been received?
   (*students not currently enrolled at the college)

4. Are there supporting resolutions from the Advisory Committee?

External Support

5. Is there evidence of approval from required licensing boards?

6. Is there a commitment from potential employers to hire the graduates of the program?

7. Is there a commitment from employers to help design and evaluate the program?

8. Is there a commitment from potential employers to participate in a work-study project?

9. What additional evidence of local support has been received (for example, unions, special agencies, community action programs, etc.)?

Discussion

The local resolutions subsystem is closely linked to the planning, resources, students and employment subsystems. In effect, responses to these latter subsystems form the base of information necessary to assess the support for the proposed programs. Support, commitment, and approval are key terms in the local resolutions subsystem. If strong and positive indicators are associated with these terms, action may be taken toward implementation of the proposed program.

Evaluation

Introduction

The use of data for the purpose of making informed decisions about a program is an activity that needs to be thoroughly planned. This subsystem is intended to help the decision-maker plan for this activity, i.e., plan for an evaluation.

Planning evaluation consists of two distinct aspects:

1) Identifying those elements for which evaluation data will be collected

2) Deciding how to analyze the evaluation data so that judgments can be made regarding the program.

This introduction and the criterion and fact-finding questions which follow will consider the first of these aspects. The discussion section will consider the second. By moving from the criterion question through the fact-finding question, the decision maker will have selected the elements he will include in his plan for evaluating the program.

Criterion Question

What are the possible elements of an evaluation plan?

The following is a comprehensive list of elements to assist the decision maker. That is, the list provides an answer to this criterion question.

Evaluation Elements

A. Considerations Prior to the Start of the Program ("Antecedent Variable")

1. Student types

a) what students enter with

i) general abilities
ii) specific skills
iii) attitudes
iv) facts, concepts and generalizations

b) SES distribution
c) sex
d) educational background
e) work experience
f) geographical distribution
   i) intracommunity
   ii) intercommunity
g) ethnic background

2. Student numbers

3. Resources
   a) faculty
      i) type
      ii) number
   b) equipment and other instructional materials
      i) hardware
      ii) software
   c) space
      i) college facilities
      ii) community facilities
   d) library
   e) transportation
   f) placement
   g) promotion-publicity
   h) funding sources

4. Local support
   a) employers
   b) faculty
   c) student
   d) community
   e) administration

5. Employment possibilities
   a) number of jobs
   b) types of jobs
   c) salary
   d) advancement potential

B. The Educational Process
("Transaction Variables")

1. General instructional strategies

2. Utilization of facilities and instructional materials

3. Social-attitudinal climate

   a) participation
   b) morale

C. Effects of the Program ("Outcome Variables")

1. Effects on student

   a) specific occupational outcomes
      i) no. employed in program-related jobs
      ii) average salary
      iii) tasks to be mastered
      iv) job performance level
      v) length of employment
      vi) advancement
      vii) range of jobs
      viii) geographical distribution of employed graduates
      ix) sex, ethnic and SES distribution of employed graduates

   b) general educational outcomes

      i) knowledge and comprehension
      ii) motor skills
      iii) attitudes
      iv) social skills

2. Effects on college

   a) college image and morale
   b) college enrollment

      i) number
      ii) quality
      iii) distribution

3. Effects on community

4. Effects on region

5. Effects on business or industry

Fact-Finding Question

What elements will be included in the evaluation plan?

The decision-maker now selects from the list of elements above those elements that are appropriate for the particular program being planned.

Discussion

At this point the decision-maker has decided on the elements for his evaluation plan. However, for his evaluation plan to be complete, he still needs to specify how the data for each element will be analyzed. That is, he needs to indicate the process by which judgments are to be made concerning the program.

The reader will notice that the list of elements is already organized according to the type of data to be collected. That is, there are three kinds of evaluative data: a) Considerations prior to the start of the program ("Antecedent Variables"), b) the education process ("Transaction Variables"), c) effects of the program ("Outcome Variables").

An "antecedent" is any condition with respect to students, local support, or employment existing prior to teaching and learning which may relate to outcomes. "Transactions" refer to the succession of engagements or encounters which comprise the process of education. "Outcomes" include the consequences of the program on the students, on the college, on the community, on the region, and on business and industry. The boundaries between these categories are not, nor need be, always clear. The categories should be used to stimulate rather than to subdivide the data collection.

With respect to analyzing these three types of data, we can compare what the program had hoped for (i.e., its "intents") with what actually occurred (i.e., our "observations"). "Intents" include those things planned for (stated either positively or negatively) whether they be planned-for environmental conditions, planned-for student behaviors, or planned-for teaching strategies. But since "the road to hell is paved with good intentions", the evaluator must also examine what acually occurs, in other words, "observations". Observations result in empirical evidence regarding the surroundings, the events, and the consequences of the program. Methods for collecting observational data include direct, personal methods as well as instruments such as inventories, biographical data sheets, interview routine, check lists, opinionnaires, and all kinds of psychometric tests.

The process of evaluation consists of first collecting data on what was planned for and on what actually occurred. Then judgments are made regarding 1) the appropriateness of the intents, and 2) the extent to which the intents were actually observed. It may be the case that the plan was executed exactly but the program failed because the plan was inadequate. On the other hand, the plan may have been adequate but was misimplemented or not implemented adequately. An evaluation schema that includes both intents and observations yields diagnostic information regarding the reasons for a program's failure or success.

In summary, the data matrix suggested here can be represented as follows:

Variables	Intents	Observations
Antecedents		
Transactions		
Outcomes		

Evaluation questions which should be asked include the following:

Were the intended antecedents appropriate for the intended transactions?

Were the intended transactions appropriate for producing the intended outcomes?

Did the intended antecedents exist or occur? (Compare intended with observed antecedents.)

Did the intended transactions occur? (Compare intended with observed transactions.)

Were the intended outcomes achieved? (Compare intended with observed outcomes.)

References

The terminology and the general approach employed in the preceding paragraphs are discussed more fully in the following references. Any college planning a systematic evaluation would be well advised to consult these references before beginning to plan such an evaluation.

Two collections of readings are particularly helpful:

1. Taylor, Peter A. and Doris M. Cowley (eds.). Readings in Curriculum Evaluation. Dubuque, Iowa, William C. Brown Co., Publishers, 1972.

2. Payne, David A. (Ed.). Curriculum Evaluation. Lexington, Massachusetts: D.C. Heath and Co., 1974.

In particular, the following works from these two collections are highly recommended. (1) and (2) refer to the two collections listed above:

Scriven, Michael. "The Methodology of Evaluation", pp. 28-48 (1)

Taylor, Peter A. and Thomas O. Maguire. "A Theoretical Evaluation Model", pp. 89-92 (1)

Stake, Robert E. "The Countenance of Educational Evaluation", pp. 90-102 (1)

Provus, Malcolm M. "The Discrepancy Evaluation Model", pp. 117-127 (1)

Krathwohl, David R. "Stating Appropriate Educational Objectives", pp. 69-80 (2)

Metfessel, Newton S., William B. Michael, and Donald Kirsner. "Instrumentation of the Taxonomy of Educational Objectives in Behavorial Terms", pp. 81-85 (2)

Metfessel, Newton S. and William B. Michael. "A Multi-Criterion Evaluation Model", pp. 143-151 (2)

Thomas, J. Alan. "Cost-Benefit Analysis and the Evaluation of Educational Systems", pp. 163-169 (2)

CONCLUSION

This stage of the system has two steps:

1. Assessment and Decision
2. Final Program Proposal

1. In the assessment step, judgments are made and a decision is reached concerning the rejection, modification or approval of a program for implementation. Negative judgments result in the rejection of the proposed program, provided its criteria cannot be altered. If the judgments are unclear, then the planner may decide to re-examine the subsystems for the possible modification of criteria. Favorable judgments lead to the next step of the system.

2. Information from the precision phase is used to describe the complete program for the final program proposal. The proposal includes information concerning each of the subsystems. It is then submitted to the college and State University for final program approval.

After the program is approved, the information from the precision phase can be as useful to the program director as it is to the program planner. For example, the director must provide for the evaluation of the program; the evaluation subsystem provides information and sources for program evaluation. Other information from the subsystem is equally important to the implementation of the program. It should be used whenever possible.

PART THREE

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"Symposium Sessions", Educational Record. Summer, 1965.

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Bogue, Jesse Parker.

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The Carnegie Commission on Higher Education.

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The Open Door Colleges. McGraw-Hill Book Co. New York, 1970.

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A Constant Variable: New Perspectives on the Community College. Jossey-Bass. San Francisco, 1971.

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"Improving Your College's Enrollment Estimates", Junior College Journal, March, 1955.

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"A Systems Approach to Education', in Educational Technology. June 1973.

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Review of Synthesis of Research Concerning Adult Vocational and Technical Education. ERIC Clearinghouse on Vocational and Technical Education. Columbus, Ohio, 1972.

Deals with the phases of course development which the authors define as:

a) Preparation phase. Contained in this phase are job description, task analysis, course objectives, criterion examination, target population, course prerequisites, prerequisite tests.

b) Development phase. This phase is concerned with outlining, sequencing, content selection, procedures selection, sequence and lesson plan completion, and course tryout.

c) Improvement phase. This last phase compares performance with development and the objectives of the job. A final revision grows out of this.

Advisory Council on Vocational Education.

Vocational Education: The Bridge Between Man and His Work. U.S. Department of Health, Education and Welfare, Office of Education, Washington, D.C., November, 1968.

Contains background information on the social and manpower environments of vocational education, including data on changing employment rates, the changing nature of the demand for labor and the operation of the U.S. Employment Service.

Some recommendations are:

a) We need different kinds of training for different goals.

b) The relative responsibilities of public agencies and private employers need to be evaluated.

c) Further study is needed on the merits of on-the-job vs. institutional public training programs.

d) The relative importance given to the work and the training aspects of work-training programs needs to be given more consideration.

e) The overlap in federal programs needs to be analyzed.

f) New methods need to be developed for finding, reaching, and motivating more of the unemployed to undertake training.

g) More study and evaluation of the effectiveness of existing training programs is needed.

Berchin, Arthur.

Toward Increased Efficiency in Community College Courses. League for Innovation in the Community College. Los Angeles, California, 1972.

Discusses the costs of various types of instructional modes (small group, large group, etc.) and suggests that those which cost less should be considered for use in the community college.

Bethel, Lawrence L.

"Vocational Education," Ch. 6, The Public Junior College. N.B. Henry (Ed.). The Fifty-fifth Yearbook of the National Society for the Study of Education. University of Chicago Press. Chicago, 1956.

Discusses the conditions influencing junior college vocational education programs. These are defined as:

a) Job trends (technical advances).

b) Socio-economic status of community.

c) Vocational characteristics of community.

d) Other educational institutions in area (to avoid duplication).

In addition the author concludes that the most important question for deciding on a vocational curricula is whether or not there is any need for the program in the community. He stresses a "Community-centered Vocational Education Program". This type of program is believed to work when:

a) The community has a need for vocational education.

b) The members of the community are interested in the community college.

c) There is a liaison between the community college and the business industry.

d) The community agrees to take on partial responsibility for financing the college.

e) The community has the opportunity to evaluate the programs of the college.

f) The college has the freedom to experiment with new programs.

g) A faculty is present who will work at assessing community needs and revising programs to suit the needs.

h) An administrator has responsibility for synchronizing the community college plans with the local business and industry.

Blocker, Clyde E., Plummer, Robert H., Richardson, Richard E., Jr.

The Two-Year College: A Social Synthesis. Prentice-Hall, Inc. Englewood Cliffs, N.J., 1965.

The authors stress the following items in initiating a technical program:

a) The curriculum must be related closely to the requirements for skills, knowledges, and understandings of the occupation or group of occupations.

b) The curriculum must be developed with the advice, counsel, and support of an industry or a profession. Unless employment can be insured for all those who receive the associate degree, the program should not be undertaken.

c) A curriculum must be sensitive to occupational changes and should not be too specialized.

d) Neither the traditional lower-division university curriculum nor the usual vocational-industrial curriculum is adequate in content or objective.

e) Nature, content, methods of instruction, and purposes of a technical curriculum should seldom, if ever, exactly follow lower division pre-professional curriculum patterns. Lower division engineering courses, by themselves, do not constitute adequate preparation for the technician.

f) The curriculum should be primarily occupation-centered. Transfer value should be of secondary importance. The technical curricula should be designed and conducted as ends in themselves.

g) Depending upon the level of the technical program, traditional academic organization of mathematics and science courses may not be realistic. Depth and scope of mathematics and science must be tailored to occupational needs. These courses must have problem-solving objectives and should place less emphasis on abstract concepts than traditional academic courses do.

h) Achievement levels and content should be based on job requirements rather than on a specified number of units and courses.

i). Craft shops and tools are needed to provide experience on practical problems. Laboratories are also needed for testing, research and experiments.

j) Community leaders must share responsibility with educators for identifying manpower needs and planning programs to meet them.

k) The increasing number of part-time and evening students must be accommodated.

l) Technical programs will cost more than college parallel programs because they require more laboratory hours, a lower student to instructor ratio, and more expensive equipment and facilities.

Bogue, Jesse Parker.

The Community College. McGraw-Hill. New York, 1950.

Suggests that occupational curricula be generated from community and state needs.

Borgen, Joseph and Davis, Dwight.

A Research and Development Project in Occupational Education. Joliet Junior College. ERIC. Illinois, September, 1970.

The economic implications of planned curricula are treated. Organizational factors (human) are increasingly important. Planning should be derived from manpower forecasting and decision-making concerning the cost benefits.

Bushnell, David S.

Organizing for Change: New Priorities for Community Colleges. McGraw-Hill Book Co., New York, 1973.

Presents the following problem-solving strategies for change:

a) Diagnose problem.

b) Formulate objectives and establish criteria.

c) Identify constraints and needed resources.

d) Select potential solutions.

e) Evaluate these alternate solutions.

f) Implement the decision.

The Carnegie Commission on Higher Education.

Less Time, More Options (Education Beyond the High School). McGraw-Hill Book Co., New York, January, 1971.

The Carnegie Commission recommended that the typical pattern of obtaining an A.B. degree should be altered so as to provide varied educational opportunities for individuals in all stages of life. This could be accomplished through use of apprenticeship programs, proprietary schools, in-service training in industry, and part-time certification programs. The A.A. degree should be the first degree sought by anyone just finishing high school. The Commission also suggested that both the federal and state governments should work to provide a community college within geographic and financial range of each American.

The long range implications of these recommendations are that more people will be utilizing the community colleges instead of pursuing advanced degrees which they don't want or need for obtaining a satisfying job.

Charness, M.H., Ritterhouse, C.H., Heald, R.C.

Decision Processes and Information Needs in Education: A Field Survey. ERIC, 1969.

The main objectives underlying this study were the identification of: critical decision processes in the field of education; and information sources and kinds of information which are used to support decision-making and planning.

Decisions to install new curricula or innovations were ranked highly important by all those concerned (superintendent, principal, district, staff, teachers).

The stumbling blocks (first five ranks) were:

a) Lack of sufficient time to study problems.

b) Too much focus on financial aspects of decision-making.

c) Need to satisfy many diverse groups.

d) Lack of qualified skills to provide research support.

e) Failure to define goals in 'operational' or 'measurable' terms. (p. 100)

The least problematic for decision-making were:

a) Overwhelming pressure from non-educational sources.

b) Change in the nature of the problem while decisions are being made.

c) Trying to relate results and programs elsewhere to local problem.

d) Inability to identify causal factors underlying educational problems.

e) Study of the wrong variables upon which decisions are based.

Earnshaw, Helen.

"Starting a Two-Year Curriculum for Library Assistants," Junior College Journal, Vol. 30, No. 2, 1965. pp. 22-23.

Discusses the development of this program in Los Angeles from: the original requests from the community for a paraprofessional library course (evening division); the transition to an A.A. degree program; and the final set up

of an advisory committee to plan the curriculum.

Education Beyond High School: The Two-Year Community College: A Report of the New Jersey State Board of Education to the Governor and the Legislature. Trenton, N.J., January, 1961.

Contains a survey of post-high school plans of New Jersey high school seniors and juniors. The conclusion is that students are highly rational in their choice of occupational goals. Many of them pursue programs of study which prepare them for positions in which there is a serious shortage of personnel.

Epler, Stephen E.

"Improving Your College's Enrollment Estimates," Junior College Journal, March, 1955.

Concludes the following information must be ascertained:

a) The number of seniors in those high schools which have contributed significantly to past and present enrollment in the college.

b) The number of students in each grade from 1 to 12 in feeder schools.

c) Births in the area for the past 2 decades.

d) Census by years of age.

e) Migration in the age groups under 20.

Evans, Dean N. and Neagley, Ross L.

Planning and Developing Innovative Community Colleges. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1973.

The following steps are recommended to insure a systematic design for an innovative program:

a) Identify the needs of the community that can be met by college programs.

b) Determine the basic philosophic approach to instructional development and the teaching-learning process that will undergird the educational programs of the college.

c) Identify the basic educational programs to be offered by the college.

d) Possibly, organize a general citizens advisory committee and special advisory committees in the career program areas.

e) Identify the basic learning sequences for each educational program.

f) Complete personnel and logistical support plans for the process of instructional development.

g) Launch the systematic process of instructional development for each learning sequence or course.

Fields, Ralph R.

The Community College Movement. McGraw-Hill Book Co. New York, 1962.

Recommendations for community college priorities are:

a) The community college should stress preparation for technical and semi-professional occupations.

b) The community college should stress continuing vocational education.

c) The community college should stress regional planning for skilled and semi-skilled occupational training.

d) The community college vocational programs should stress general education.

Fields, Ralph R.

"The Program Defined and Implemented," Ch. 9, The Public Junior College. N.B. Henry (Ed.). The Fifty-fifth Yearbook of the National Society for the Study of Education. University of Chicago Press. Chicago, 1956.

Suggests the proposed program should meet the following criteria:

a) It should be connected with the original purpose of the community college.

b) It should be connected with community interests, needs and concerns (therefore, different colleges will have different programs).

c) It should be consistent with the staff's philosophy.

Several approaches to the initiation and revision of programs are given. They are as follows:

a) Surveys of community and student needs. These should determine which occupations need pre-employment training, where institutions should be located to serve the occupational needs of the area, and the number of students to be allowed in the program.

b) Local surveys. These should focus on census data, state reports, various formulas for projected enrollments, and job estimates from employers and high school guidance counselors.

c) Student need surveys. The basic principles of program development are:

1. The program must be need-centered. It must emerge from a community-student need.

2. Everyone involved must be concerned with the program's development and improvement.

3. The program must reflect the uniqueness of the local community.

4. Evaluation is necessary for the program's improvement.

Gillie, Angelo.

"Search for a Statewide Framework: Occupational Education in Pennsylvania," Junior College Journal, Vol. 40, No. 7, 1970. pp. 15-19.

This article mainly deals with statistical analysis. It discusses the enormous problems in science education in the state before the implementation of a master plan in 1963.

Gleazer, Edmund J., Jr.

Project Focus: A Forecast Study of Community Colleges. McGraw-Hill Book Co. New York, 1973.

This book emphasizes the increased role of the state and the legislature in the decision-making process which results from the increased financial support being sought from the state and increased pressures for accountability for tax dollars.

Local colleges, boards and communities have resisted this development and are increasing demands to participate in decision-making.

Grede, John F.

"Trends in Occupational Education;" Illinois, Junior College Journal, Vol. 40, No. 7, 1970. pp. 20-26.

The criteria for planning community college programs should be:

a) A determination of total job needs.

b) A determination of the components of total job training which the junior colleges may provide.

c) The program needs in specific categories.

Hallstrom, Ronald W.

"Three New Twists in Occupational Education," Junior College Journal, Vol. 38, No. 3, 1967. pp. 46-48.

Describes new ideas for disseminating information about junior colleges. They are as follows:

a) Displaying information about the college in racks strategically located in the community.

b) Giving industry the major responsibility in the recruiting of students for work-study programs.

c) Offering community training for the needs of existing personnel.

Hurlburt, Allan.

State Master Plans for Community Colleges. AAJC Monograph 8. ERIC, 1969.

State master plans need to include occupational education programs since these programs reflect the need for increased occupational training in the state. Two program markets for occupational education programs are the state market of traditional jobs and the local market which reflects more specialized skills.

Ingles, Edwin T.

"Criteria for Adding New Courses to the Junior College Curriculum," California Journal of Secondary Education, Vol. 32, No. 1, April, 1957. pp. 218-221.

Ingles provides a checklist for teachers, department chairmen, curriculum committees and administrators to use when establishing, continuing or abolishing new courses. Two lists of criteria are developed: one for faculty, which deals with academic need, and the other for administrators, which deals with economic feasibility.

One criticism of this system is that it is too simplistic. If a program does not meet all the criteria, should it be scrapped? Some of the criteria are mutually exclusive and there is no way to weigh the question.

Johnson, B. Lamar.

"Encouraging Innovation in Teaching," Junior College Journal, Vol. 39, No. 6, 1969. pp. 18-22.

Discusses various ways for the faculty and college to encourage innovation. Two primary ways are to visit other colleges and to experiment with programs of other institutions. A "Vice President in charge of Heresy" is the key idea in this article.

Johnson, B. Lamar.

General Education in Action: A Report of the California Study of General Education in the Junior College. American Council on Education. Washington, D.C., 1952.

This report gives proposed criteria for judging vocational courses.

Groups of vocational teachers working in this study gave considerable attention to the relationship of their instruction to general education. One such group proposed criteria for appraising courses in their fields. In addition to specific occupational skills and competences, the following were proposed as criteria for judgment:

a) Has the student developed the ability to spell, write, read, and listen with meaning and understanding?

b) Has the student developed the ability to think critically in the solution of problems?

c) Has the student been assisted in developing a set of ethical standards by which to live?

d) Has the student been aided in developing desirable mental and physical health habits?

e) Has the student been aided in developing some satisfying vocational activity?

f) Has the student shown progress in the exercise of the privileges and responsibilities of democratic citizenship?

g) Has the student been made aware of the contribution to job success of harmonious human relations, including home and family relations?

The report also defines the goals of vocational courses to include the acquisition of the following skills and knowledge by students:

a) To perform successfully in an occupation.

b) To enter employment and adjust satisfactorialy to a job.

c) To acquire technical knowledge and general education related to a specific skill.

d) To acquire social understanding.

e) To formulate a philosophy of life.

f) To keep in good health.

g) To be a responsible citizen.

Johnson, B. Lamar.

Starting a Community Junior College. American Association of Junior Colleges. Washington, D.C., 1964.

This article presents the pros and cons of various alternative practices in program planning. It makes recommendations on: conducting community surveys; the use of a lay advisory committee; types of library services, etc.

Knowles, Asa et.al.

Handbook on Cooperative Education. Jossey-Bass. San Francisco, 1971.

The thesis of this handbook is that curriculum change shouldn't take place in cooperative education program(s) before the program has been accepted into the curriculum.

Koch, Moses and Walley, Priscilla.

"Established: A Curriculum to Train Urban Professional Assistants," Junior College Journal, Vol. 38, No. 2, 1968. pp. 20-24.

Defines various problems in developing curricula as:

a) Getting professional planners who could take time to educate.

b) Placement.

c) Recruitment for students.

d) Design of curriculum (skills students need to possess when finished).

Litchfield, Edward H.

"Organization in Large American Universities (The Administration)," Journal of Higher Education, 30: 489-504, 1959.

Rational decision-making in higher education administration is defined as being composed of five steps whether it is done by an individual or a group. They are:

a) Definition of the issue.

b) Analysis of the existing situation.

c) Calculation and delineation of alternatives.

d) Deliberation.

e) Choice.

The administration itself is a cyclical process and involves:

a) Decision-making.

b) Programming.

c) Communication.

d) Control.

e) Reappraisal.

Problems with large universities are cited as:

a) No central structure for decision-making.

b) Staff is not available to carefully calculate decisions.

c) Decisions get delegated to specific departments and head administrators serve as figureheads.

Alleviation of the above problems can be facilitated by the following measures:

a) A series of academic vice presidents who would have the time to do research and a base on which to evaluate alternatives. They would be more informed on the issues than the president could be.

b) Organized staff meetings to consider alternatives to a decision -- this group would not have any decision-making power.

c) The president would have staff who could aid him in budgeting, personnel, organization and methods, academic research, and total institutional planning.

The main point of the article is that decisions should not be made by one person. There are five steps for rational decision-making and each group in the administration (i.e., faculty, dean, president, trustees) can fulfill a role in that decision. This process would facilitate communication as well as make people feel important in their roles.

Monagan, George C.

"A Recreation Supervision Curriculum for the Junior College," Junior College Journal, Vol, 38, No. 8, 1968. pp. 30, 31, 34.

This article deals with the development of a program to train recreation leaders and supervisors. Initially a lay advisory committee was set up (in the field of education). A study was then made to determine recreational needs. It was found that there was in fact a need for recreation leaders in Monroe County and surrounding counties. The final step entailed building a curriculum around these needs. Unfortunately, the author neglected to tell what considerations went into the design of the curriculum.

Morris, Bill and Hubbard, John.

"COPES: A Measure of Success," Community and Junior College Journal, Vol. 43, No. 8, May, 1973. pp. 29-31.

COPES stands for Community College Occupational Programs Evaluation System, a division of Occupational Education in the State Government. Composed of business and industrial leaders, it was designed by a consulting firm to investigate Foothill Community College. This group was created specifically to present a final computerized profile of the school, a portrait derived from various points of view. The primary tasks were to define the college's goals and objectives, instructional support services, and resources.

Rarig, Emory W.

The Community Junior College (An Annotated Bibliography). New York: Teachers College Press, 1966.

Ricciardi, Nicholas.

"Curriculum-Building Meets Expanding Needs," Junior College Journal, Vol. 7, No. 8, 1937. pp. 444-447.

The elements of curriculum building are composed of:

a) Learner.

b) Instructor.

c) Society (vocational trends).

d) Activities.

e) Evaluation.

Riendear, Albert J.

The Role of the Advisory Committee in Occupational Education in the Junior College. American Association of Junior Colleges. Washington, D.C., 1967.

Contains an analysis of the changing character of occupational education; the nature and objectives of post-high school education; community involvement in the college occupational program; the specific functions of advisory committees; the organization and administration of the advisory committee; implementation of advisory committee recommendations; and expectations of advisory committee members.

Sine, John and Pesci, Frank.

"Occupational Education Development in Rural America," Community and Junior College Journal, Vol. 43, No. 8, May, 1973. pp. 26-28.

Eight methods of developing occupational programs in rural communities are given:

a) Manpower surveys.

b) Occupational advisory committees.

c) Full-time department chairmen.

d) Determining the potential student enrollment.

e) Occupational skills surveys.

f) Determining the life of the program.

g) Instructional department.

h) Faculty curriculum committees.

The authors discuss the problems rural communities have in using the above standards. They conclude that imagination and persistance are more vital to the development of a program than the administrative system of approval. Rural community colleges should develop programs quickly through the use of "uncluttered systems of communication."

Skaggs, Kenneth G.

"Occupational Education: The Program Crisis," Community and Junior College Journal, Vol. 43, No. 8, May, 1973. pp. 11-12.

This article discusses several problems facing occupational education programs. They are defined as:

a) Narrow occupational training for dead-end jobs.

b) Difficulties in recruiting students.

c) State or community insistence on developing certain programs which the college really can't afford.

d) Large attrition rate.

e) Placement - Students are sometimes not as well trained as in apprentice programs. Two ways of alleviating this particular problem are to re-evaluate the curricula from the point of view of changing technology and to provide field work experiences.

f) Difficulties in finding effective teachers.

Skaggs, Kenneth G., Burris, Douglas W., Fibel, Lewis R.

"Report and Forecast: AAFC Occupational Education Project. Junior College Journal, Vol. 37, No. 6, 1967. pp. 23-25.

A set of curriculum guidelines in occupational education are put forth and goals of occupational education are delineated.

Steinberg, Sheldon and Skatz, Eunice.

"Junior Colleges and the New Careers Program," Junior College Journal, Vol. 38, No. 5, 1968. pp. 12-17.

This article discusses the training of "underemployed" to function as human services aides in the community.

The authors conclude that job descriptions should be worked out before training and curricula developed out of the advice of professionals.

Teeple, John B.

"Variables in Planning Occupational Education Programs," Junior College Journal, Vol. 40, No. 6, March, 1970. pp. 90-98.

Four variables affect the planning of occupational education programs:

a) Goals -- We must allocate resources according to clearly defined goals and well-ordered priorities.

b) Jobs -- Projected manpower requirements should be in accordance with general trends and goals such as health, education, social welfare, etc. We should estimate the magnitude of future job openings in various fields. New jobs and attrition should be estimated also.

c) Plan -- The role of national vs. local manpower estimates depends on the mobility of population and special economic characteristics (if any) of a region. Defining a local area may be a problem.

We need to ask -- Will students take this course?

We need follow-up studies to see if students really enter the field.

d) Task -- The question is how to develop and implement a plan. We should not do this alone; we need wide-spread involvement and commitment.

Thorton, James W.

The Community Junior College. John Wiley & Sons. New York, 1966.

This is a general text of community college education. The vocational education section discusses occupational education decision-making. A community occupational survey approach was used (Contra Costa County, CA) in which community members answered questions about (1) research, (2) development of plans and (3) implementation. The questions in each of the categories dealt with the feasibility, desirability, and need of the specific occupational curricula in question.

After administrators approve certain curricula, "lay advisory committees" are established to inform the community of these programs and to receive advice from the community members. Special long-term advisory committees are selected to judge specific curricula on the training they offer to students. Curriculum decisions are based on information from the community (in the form of service requests), programs of other junior colleges, college and university curricula, and state and federal education priorities.

In many community colleges the Dean of Instruction is in the position of supervising the quality of instruction of all courses. He is also the chairman of the curriculum committee which is responsible for deciding upon proposals for all curricula.

The author sees occupational education as fulfilling one of the missions of community colleges; the courses provide immediate employment for students.

There are vast differences in occupational education course offerings among community colleges.

Some questions to be considered in occupational education course offerings are:

a) Program Development.
Global program (one instructor teaches all) or specialized instruction by a variety of teachers.

b) Training of the Students.
How specialized should it be? How many liberal arts courses should be included?

c) Community Cooperation.
Are there employment possibilities for students who finish the program?

d) Students.
Will they remain for the entire program? How qualified must the student be to get into the program?

Ward, Phebe.

Terminal Education in the Junior College. Harper and Brothers. New York, 1947.

Guidelines for developing an occupational education course are set. These are:

a) Establishing a Need.

1. Record students who enter (see what happens to them).

2. Community survey -- one occupations survey at a time.

3. Interviewing and testing potential students.

4. Enrolled students' status compared with the norms for the community.

5. Former students' needs.

6. Employer conferences.

7. Faculty and administrators judgment.

b) Organizing a Curricula.

1. Choose advisory committee.

2. Combine general education goals with occupational education goals.

3. Select instructors.

c) Administering and Supervising the Curriculum.

1. Choosing coordination for the program.

2. Train faculty.

3. Inform community of program.

d) Evaluating the Curriculum.

Occupational education -- See if the student can do the job he was trained to do.

e) Revising the Curriculum.

Make use of evaluations in this. Provide for flexible adjustment in order to meet the needs of the students and community.

ANNOTATED BIBLIOGRAPHY

Concepts and Sources of Data for Manpower Analysis

Bulletin 1816

Bureau of Labor Statistics
Division of Manpower and Occupational Outlook

The following bibliography lists specific sources of supply information. Although many useful data sources are not included here, the listing is intended to provide a representative sampling in all areas. Some sections, however, are more complete than others: Section VII on labor force separations and deaths probably covers most existing sources, while Section III on follow-up studies gives a necessarily limited selection of hundreds of studies. In general, no attempt was made to include State and local data in any sections, although many items may be useful for subnational analyses. The sections of the bibliography include the following:

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I. Current Supply Data

A. Census and Current Population Surveys

1. U. S. Department of Commerce, Bureau of the Census. 1970 Census of Population, Classified Index of Industries and Occupations, 1971.

Defines the industrial and occupational classification systems for the 1970 Census of Population, and lists the industry occupational titles which constitute each classification category. The system includes approximately 10,000 industry and 23,000 occupational titles.

2. _____, _____. Census of Population: 1970 Subject Reports, Final Report PC(2)-7A, Occupational Characteristics, 1973.

Employment and unemployment data for detailed occupations by color, sex, class of worker, earnings, and a variety of other characteristics. Data for earlier censuses are available in publications of the same title for the appropriate census years.

3. _____, _____. Census of Population: 1960 Subject Reports, Final Report PC(2)-7E, Characteristics of Professional Workers, 1964.

Contains similar items as PC(2)-7A but in greater detail for professional workers. Not published for 1970 Census or censuses before 1960.

4. U. S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings, monthly.

Monthly national data on employment and unemployment by major occupational group collected in the Current Population Survey are presented in Table A-18; annual averages appear in the January issue. The October 1973 issue contains 1972 annual averages for nearly 150 occupations, or combinations of occupations; data for subsequent years will appear in the March issue.

B. Occupational Employment Statistics Program

5. U. S. Department of Labor, Bureau of Labor Statistics. Occupational Employment Statistics, 1960-1970. Bulletin 1738, 1972.

Discusses the BLS occupational employment statistics program and presents data from the 1968 metalworking survey, the 1970 printing and publication survey, and the 1970 radio-TV equipment communications manufacturing survey. Further discussion of the radio-TV survey is available in the June 1968 Monthly Labor Review.

6. _____, _____. Occupational Employment, Special Industry Machinery, except Metalworking, June 1971. Report 430-3, April 1974.

Reports results of survey for SIC 335.

C. Surveys of Scientific and Technical Personnel

7. National Science Foundation publications:

Science and Engineering in American Industry, Final Report on a 1953-1954 Survey. NSF 56-16, 1956.

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Andrews, Edith W. and Moylan, Maurice. "Scientific and Professional Employment by State Governments," Monthly Labor Review, August 1970, p. 40-45. Reprint includes Appendix Tables A-1 through A-29.

Employment of Scientific and Technical Personnel in Industry, 1962. Bulletin 1418, June 1964.

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Scientific and Technical Personnel in Industry, 1961-66. Bulletin 1609 (1969); 1967, Bulletin 1674 (1970); 1969, Bulletin 1723 (1971); and 1970, pamphlet (1972).

D. Industry-Occupation Matrix

9. U. S. Department of Labor, Bureau of Labor Statistics. Occupational Employment Patterns for 1960 and 1975. Bulletin 1599, 1968.

This bulletin provides a detailed description of the procedures followed in developing the 1975 matrix.

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This bulletin discusses the methods used in developing the 1967 and 1970 matrices.

11. _____, _____. Tomorrow's Manpower Needs, Vol. I-III, Bulletin 1606, February 1969, and Vol. IV (Revised), Bulletin 1737, 1971.

These four volumes provide up-to-date manpower projections and a guide to their use in developing state and area manpower projections. The industry-occupation matrix tables and other manpower data are presented in Vol. IV.

E. Bureau of Labor Statistics Wage Surveys

12. Directory of Industry Wage Surveys and Union Wages and Hours Studies, 1960-1973, 1973.

Lists industries covered in the BLS industry wage survey program, including publication titles, bulletin numbers, and a limited description of their content.

13. _____. Area Wage Surveys, Metropolitan Areas, United States and Regional Summaries, 1970-71. Bulletin 1685-92, 1973. Annual since 1960, various bulletin numbers. Before Bulletin 1455 (1965-66) the series were called Occupational Wage Surveys. Data for individual metropolitan areas are published in individual volumes.

F. U. S. Department of Health, Education and Welfare

14. Office of Education. Digest of Education Statistics. Annual since 1962.

Contains historical data on enrollments, teacher employment, degrees conferred, and other items. Compiled from a variety of original sources listed in the footnotes to each table.

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This report is the first phase of project SOAR (Supply, Output, and Requirements), a comprehensive review of health manpower for use in planning health programs.

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20. Air Transport Association of America. Air Transport Facts and Figures. Annual.

Contains occupational employment figures compiled from airline industry reports filed with the Civil Aeronautics Board.

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    Contains occupational employment statistics for Class I railroads. Before 1966 see Statement M-300.

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28. American Chemical Society. American Chemical Society Member Employment Status, Staff Report, Division of Professional and Manpower Studies. Annual.

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40. Engineers Joint Council. American Engineering Manpower 1969. November 1971. Earlier publications include data for 1964 and 1967.

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Contains data on employment and unemployment of engineers by degree level, age, citizenship, year of degree, and other characteristics. Based on a survey of 60,000 engineering society members.

42. _____. A Profile of the Engineering Profession. March 1971.

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Contains counts of registered pharmacists from licensure statistics as well as additional data from NABP censuses.

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Degree recipients by field, sub-field, institution, and degree level beginning with 1958. Data differ from those of the office of education in that 1) they are counts of individuals, not degrees conferred, 2) they include only research doctorates and exclude performance doctorates not requiring a research dissertation, 3) classification by field and sub-field are different, and 4) data are by fiscal year instead of academic year.

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Data on enrollments classified by field of specialization, level of study, attendance status, sex, state, institutional level and control, and by individual institution.

52. _____, _____. Projections of Educational Statistics. Annual since 1964.

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53. _____, _____. Publications of the National Center for Educational Statistics. (OE) 73-11,000. Annual.

Lists regular publications of the Office of Education, National Center for Education Statistics. Headings include Elementary and Secondary Education, Higher Education, Library Statistics, Adult and Vocational Education, and others.

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Contains extensive summary data as well as data on individual institutions for 1) associate degrees meeting bachelor's degree credit criteria, 2) awards in organized occupational curriculums for work at the technical or semiprofessional level, and 3) awards in organized occupational curriculums for work below the technical or professional level. Data are reported by type and length of curriculum, state or area, and sex of recipients.

C. Federal Manpower Programs

55. U. S. Department of Health, Education, and Welfare, Office of Education. Inventory of Vocational Education Statistics in Federal Agencies (OE-80069), 1970.

Lists by agency sources of data on occupational training, including MDTA, health training programs, and many other programs.

56. U. S. Department of Labor. Manpower Report of the President. Annual since 1963.

Statistical appendix presents summary data on Federal manpower programs, including total enrollments, completions, and post-training employment. Manpower policy developments of each year are discussed in the text of the report. For further information see Index to the Manpower Reports of the President, 1963-1972.

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57. U. S. Department of Health, Education and Welfare, Office of Education. Annual Report on Vocational and Technical Education. Annual 1965-69.

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61. U. S. Department of Labor, Bureau of Labor Statistics. Tomorrow's Manpower Needs, Bulletin 1606, Supplement 3, 1973.

Contains conversion tables for matching occupational classifications of BLS projections to vocational education program codes.

E. Apprenticeship Programs

62. U. S. Department of Labor. Manpower Report of the President. Annual since 1963.

Contains summary data on annual new registrations, cancellations, and completions of apprenticeship training since 1947.

F. Employer Training (except apprenticeship)

63. Foster, Howard G. "Non-appentice Sources of Training in Construction," Monthly Labor Review, February 1970, p. 21-26.

Reports the results of a survey of 784 construction craftsmen and over 70 businessmen in upstate New York, including data on percent of respondents receiving training from various sources.

64. Neary, James H. "The BLS Pilot Survey of Training in Industry," Monthly Labor Review, February 1974, p. 26-32.

Describes the results of the BLS pilot survey of training in metalworking industries, including methods of data collection and the survey design. The pilot survey was conducted to determine whether reliable data could be collected on training enrollments and completions in industry.

65. Somers, Gerald G. Availability of Data on Company Training Programs: A Feasibility Study. Madison: University of Wisconsin, 1971.

Includes limited pilot survey data on company training.

66. _____, and Roomkin, Myron. Training and Skill Acquisition: A Pilot Case Study. Madison: University of Wisconsin, 1972.

Reports on a study conducted for the Manpower Administration of the U. S. Department of Labor, aimed at determining the training procedures, the sources, costs and benefits of skill acquisition and transferability of skills in one company. The study had the additional purpose of refining methodological techniques in survey's of company training programs.

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A survey of occupational preparatory and advanced training programs in hospitals, including nursing, laboratory services, and several other areas. Data include type of award granted, entry requirements, enrollment, cost, and relationship to MDTA and JOBS. Conducted for HEW by the American Hospital Association.

68. U. S. Department of Labor, Manpower Administration. Formal Training of Adult Workers. Manpower/Automation Research Monograph No. 2, 1964.

Reports on a 1963 survey of workers between the ages of 22 and 64 who had completed less than three years of college. Respondents were asked how much education they had; whether they had taken occupational training in high school, technical school, correspondence schools, company training programs, apprenticeship, or the Armed Forces; and whether they used their training in their current job. The sample was the April 1963 Current Population Survey sample of 35,000 households.

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G. Armed Forces

71. Clark, Harold F. and Sloan, Harold S. Classrooms in the Military: Account of Education in the Armed Forces of the United States. New York: Columbia University Teachers College, Bureau of Publications, 1964.

72. U. S. Department of Defense, Office of Assistant Secretary. Selected Manpower Statistics. Annual.

Data on persons discharged from the Armed Forces, by broad military job classification.

73. _____, _____. Transitional Manpower Programs, 1970.

Contains information on Project Transition.

H. Private vocational schools

74. U. S. Department of Health, Education, and Welfare, Office of Education. Directory of Post-secondary Schools with Occupational Programs, 1971. DHEW Publication No. (OE)73-11410. 1973.

A comprehensive list of all schools offering post-secondary occupational training, including private vocational schools as well as 2- and 4-year colleges.

75. _____, _____. Survey of Programs and Enrollments in Post-Secondary Schools. In process, 1973.

Survey of a sample of schools drawn from the Directory cited above.

III. Follow-up Data

A. Colleges and Junior Colleges

76. American Institute of Physics. 1967-68 Graduate Student Survey. AIP Publication No. R-2071, January 1969.

Reports on a survey of 9,000 students enrolled in graduate physics departments, including information on age, sex, and citizenship; graduate education; undergraduate major; geographic region; type of employment accepted by new master's and doctor's degree recipients; and number of job offers.

77. _____. Summary Report: Survey of Physics Bachelor's Degree Recipients, 1967-68. Publication No. R-211, December 1968.

Based on results of a survey of 2,890 bachelor degree recipeints, the report provides data on regional distribution, post-baccalaureate plans, age distribution, sources of support for graduate study, type of employment accepted, and median salary.

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79. _____, and Panos, Robert J. The Educational and Vocational Development of College Students. Washington, D.C.: American Council on Education, 1969.

Presents data on college freshman of 1961 who were followed-up in 1965, examines changes in career choices over the four-year period as well as predictors of career choice.

80. Astin, Helen and Bisconti, Ann S. Career Plans of College Graduates of 1965 and 1970. Bethlehem, Pa.: College Placement Council, Incorporated, 1972.

Reports on entry to employment by type of employer, undergraduate major, occupation, and other items. Based on data from the American Council of Education.

81. _____, _____. Undergraduate and Graduate Study in Scientific Fields. Washington, D.C.: American Council on Education, ACE Research Reports, Vol. 8, No. 3, August 1973.

This report examines the flow of a national cohort of college freshmen of 1961 over a decade, focusing on patterns of undergraduate study, attrition, degree attainment, advanced study, and employment. Findings on the progress and goals of 1966 freshmen are included as a means of comparison with the 1961 cohort. Contains 78 separate cross-tabulations.

82. _____, El-Khawas, Elaine and Bisconti, Ann S. Beyond the College Years. Washington, D.C.: American Council on Education, 1974.

Report prepared for National Science Foundation and National Institutes of Health, uses correlation and regression analysis to examine factors associated with career outcomes and presents data on career flows.

83. Bayer, Alan, Royes, Jeannie, and Webb, Richard. Four Years After College Entry. Washington, D.C.: American Council on Education, ACE Research Reports, Vol. 8, No. 1, 1973.

Follow-up of a sample of the freshmen class of 1967.

84. Berger, Alan S. Longitudinal Studies on the Class of 1961, The Graduate Science Students. Report No. 107. Chicago: National Opinion Research Center, January 1967.

Using a sample of 4,394 seniors from 135 accredited institutions, the report deals with three major areas: actual graduate enrollment in science fields, the percentages of those actually enrolling, and the career activities of graduate students in the selected science fields.

85. Blank, Arthur, Koneisky, Margaret, Kogan, Leonard, and Podell, Lawrence. The Graduates Restudied: A Comparison of the Follow-up of New York City High School Graduates of 1970 and 1971. New York: Center for Research, The Graduate School and University Center, The City University of New York, 1972.

86. Boercker, Fred, Harmon, Lindsey R., and Kelly, William C. "Employment Status of Recent Recipients of the Doctorate," Science, May 22, 1970, p. 930-39.

87. Calvert, Robert Jr. "Liberal Arts Graduates - What Do They Have to Report?" Journal of College Placement, February-March 1969.

Based on a study conducted through the Survey Research Center of the University of California at Berkeley, the article describes the employment activities of 11,000 graduates from the classes of 1948, 1953, and 1958 from 100 liberal arts institutions. Data are presented about their salaries, how they feel about their careers, how hard they work, who helped them obtain their jobs, how they feel about a liberal arts education, whether they have a clear career direction.

88. College Placement Council, Incorporated. Careers of College Graduates Within the Private Sector. Forthcoming 1974.

Career patterns of men and women currently employed in private companies compared to those of men and women in other sectors. Focus on dynamics of career choice in these settings, including reasons for choices, academic achievement, and degree attainment.

89. _____. The College Graduate: Turnover and Mobility. Report No. 3, Bethlehem, Pa., 1970.

Using National Opinion Research Center data for 33,000 graduates of class of 1961, the report studies labor force mobility and job changing during the five years after graduation. Detail includes degree field, type of employer, and sex. Earlier reports in the series deal with graduates attitudes toward business, and job satisfaction.

90. _____. College-Year Plans and Long-Run Career Outcomes of College Graduates. Forthcoming 1974.

Actual occupations of college graduates compared with college-year plans. Analyses flow directly from Career Plans of College Graduates of 1965 and 1970, but provide greater detail in classification of majors and careers.

91. _____, and Sandia Corporation. "A Statistical Report: Placement and Recruitment," Journal of College Placement, April 1965.

This survey of 644 placement officers indicates types of placement services provided, number of students assisted, types of jobs and size of placement staff, and an analysis of turnover among the placement staff.

92. Council, Kathryn A. Attrition: A Campus Profile. Raleigh: North Carolina State University, Student Affairs Research, October 1972.

Reports attrition rates by type of program for NCSU students entering in 1965.

93. Dickinson, Carl and Newbegin, Betty. "The Occupations They Are Choosing," Journal of College Placement, February-March 1968.

Data for this study are from a questionnaire follow-up of 1,171 male graduates of the University of Washington who completed their bachelor's degrees between March and December 1966. Tables show the type of employer chosen by major field, monthly starting salaries, and percentages entering graduate study.

94. _____. "Pursuing the Engineer," Journal of College Placement. October-November 1967.

A survey of 345 engineering graduates at the University of Washington who completed their degree requirements between December 1965 and December 1966. The effects of various factors on engineers career choice are studied, such as academic performance, campus interviewing, salary, location, and type of work.

95. El-Khawas, Elaine and Bisconti, Ann S. Five and Ten Years After College Entry. Washington, D.C.: American Council on Education, ACE Research Reports, Vol. 9, No. 1, 1974.

Description report including 1971 data on college freshmen of 1961 and 1966.

96. Engineering Manpower Commission. Engineering and Technology Graduates. New York: Engineers Joint Council. Annual.

Survey of 2-year associate degrees granted for completion of engineering and technology curriculums.

97. _____. Placement of Engineering Graduates. New York: Engineers Joint Council, Annual.

Data from a survey of over 200 engineering schools, provides information on the placement status of 24,000 technical and 14,500 non-technical graduates who received bachelor's degrees. Number and percentages of graduates entering employment, graduate school, and military service are given.

98. _____. Prospects for Engineering and Technology Graduates 1968. New York: Engineering and Technology Graduates 1968. New York: Engineers Joint Council, September 1968.

Based on 208 engineering schools and 52 other technological institutions, this survey provides information on the placement status of 26,815 graduates in 1968. Gives entrance rates of graduates into labor force, graduate schools, and the military.

99. Ginzberg, Eli. "The Conservation of Talent--Lessons for Management," Journal of College Placement, October-November 1965.

A study of the career development of 342 male students who had been awarded graduate fellowships by Columbia University during the early post-World War II years (1945-1951).

100. Hunt, Donald C. Their First Jobs After College. Detroit: University of Detroit. Annual.

Bachelor's graduates from the University's Schools of Architecture, Arts and Sciences, Commerce and Finance, and Engineering report their experiences. Charts give data on degrees, sources of job references, starting salaries, reasons for job selection, and correlation of hometown to final job location.

101. Kauffman, Warren E. "The Class of 1963," Journal of College Placement, April 1964.

A nationwide study of 51,000 graduates of 102 colleges and universities. Data are available on those who accepted employment as of June 1963, the proportion going on to graduate school, the number still seeking employment, and the number entering the military.

102. Mercer, Charles. Public Post-Secondary Education in the U. S.. Center Monograph No. 3. Chapel Hill: University of North Carolina, Center for Occupational Education, 1969.

103. National Opinion Research Center. Patterns of Change in the Long Run Career Fields of June 1961 College Graduates. September 1965.

Changes in career fields of 41,000 college students are analyzed to three years after graduation. One hundred fields are examined concerning the students from 135 institutions.

104. National Research Council, National Academy of Sciences. Careers of Ph.D.'s - Academic versus Non-academic - A Second Report on Follow-up of Doctorate Cohorts 1935-1960. Career Patterns Report No. 2, Publication 1577, 1968.

By studing the careers of 10,000 holders of third-level research degrees, systematically selected from the graduating classes of 1935, 1940, 1950 and 1955 and 1960, this report focuses on the factors associated with choice of employment in academic or other settings, with particular emphasis on the circumstances surrounding a change in employer category.

105. _____, _____. Doctorate Recipients from United States Universities. Annual since 1966.

Gives number of degrees, post-doctoral plans, employment and field of work, by specific field of degree. Includes historical data beginning in 1958.

106. _____, _____. Education and Employment Patterns of Bioscientists, a Statistical Report. February 1971.

Contains data from many sources on enrollments, degrees earned, and employment. Identifies areas where data are not readily available, bibliography.

107. National Science Foundation. Two Years After the College Degree--Work and Further Study Patterns, NSF 63-26, 1963.

Reports on a 1960 survey of over 40,000 1958 baccalaureate degree recipients. Includes data on work and further study activities.

108. Newark College of Engineering, Placement Office. Senior Survey. Annual.

Reports placement of engineers by type of work, salary, type of employer, and location.

109. Pervin, Lawrence. "Counseling the College Dropout," Journal of College Placement, October-November 1965.

This study at Princeton University analyzes career accomplishments of college dropouts from three classes - 1940, 1951, and 1960. A study of those returning to college is included, indicating an increase in successive years.

110. Schwartz, Mildred A. United States College-Educated Population: 1960. Report No. 102. Chicago: National Opinion Research Center, October 1965.

Answers questions such as what proportion of those with college degrees are actively employed, what percentage are employed in the field of their degree. The report shows contrasts among degree levels and age/sex groups.

111. Sharp, Laure M. "Graduate Study and Its Relation to Careers: The Experience of a Recent Cohort of College Graduates," Journal of Human Resources, Fall 1966, p. 41-58.

Data on entrance rates of those with graduate school background. Employment patterns are given for those in the study. Based on the college degree data (see below).

112. _____. "The Meaning of the Bachelor's Degree: Some Recent Survey Findings," Sociology of Education, Winter 1968, p. 93-109.

Gives limited statistical information on the value of a college education as it concerns entrance into the labor market. Based on data from Two Years After the College Degree (see National Science Foundation above).

113. _____. et. al. Five Years After the College Degree. Washington D.C.: Bureau of Social Science Research, 5 volumes:

Part I: Graduate and Professional Education. 1965.
Part II: Occupational Outcome (Text Tables: Appendix Tables). 1965.
Part III: A Methodological Note. 1966.
Part IV: Military Service. 1967.
Part V: Geographic Mobility. 1967.

Based on a survey in 1963 of 1958 bachelor's degree recipients including a subsample of individuals surveyed in the National Science Foundation study, Two Years After the College Degree, who obtained further graduate and professional education during 1958-1963. Describes occupational entry and other characteristics by type of training.

114. _____ and Myint, Thelma. Graduates of Vocational-Terminal Programs in Junior Colleges, Results of a Follow-up Study of the Class of 1966. Washington, D.C.: Bureau of Social Science Research, September 1970.

Data is presented on entrance rates, starting salary, type of employer, and other items for junior college graduates.

115. Snelling, W. and Boruch, R. Science in Liberal Arts Colleges: A Longitudinal Study of 49 Selective Colleges. New York: Columbia University Press, 1972.

A follow-up study of recipients of bachelor's degrees in science.

116. Spaeth, Joe L. and Miller, Norman. Trends in the Career Plans and Activities of June 1961 College Graduates, March 1965.

The Office of Education and the National Institutes of Health sponsored this study emphasizing the choice of field for the careers of 1961 college graduates.

117. Staum, Alfred M. "1967 Social Work Graduates: Salaries and Characteristics," National Association of Social Workers, Personnel Information, March 1968.

Of 3,817 graduates of the 64 schools of social work, 1,937 responded to the survey. Ten tables provide information on the graduates by age and sex, prior employment, plan for future education, type of practice, type of employer, and salary by employment, sex, type of practice and prior experience.

118. Taplin, Lois. Employment Patterns of Xavier University Graduates-1964. Xavier University Placement Office, 1967.

Given entrance rates for 1964 graduates of Xavier University. Different types of occupations are analyzed for the relationship - if any - to the college major.

119. Underhill, Ralph. Occupational Values and Post-College Career Change. Chicago: National Opinion Research Center, June 1967.

A response to questionnaires sent each year for 3 years to 15,850 male college graduates. Career variations are examined in relation to occupational choice and values. This follow-up provides information on the entrance into the work force of these graduates.

120. U. S. Department of Labor, Women's Bureau. College Women - 7 Years After Graduation 1966, Bulletin 292, 1966.

A seven-year follow-up of women who graduated in 1957. The present status of the graduates concerning employment, education and salaries is presented.

121. _____, _____. 15 Years After College. Bulletin 283, 1962.

An exploratory survey of 580 alumnae from 4 colleges in 1945. It gives detailed employment patterns of graduates and non.

122. _____, _____. Trends in Educational Attainment of Women. Annual since 1965.

Tables and charts provide information on female high school graduates, college degrees conferred, and the labor force participation rates of women from 1952 to the present.

123. University of Illinois. 1960 Engineering Graduates - Where Are They Now? Urbana: University of Illinois, College of Engineering, 1965.

A 5-year follow-up study of 1960 graduates. Statistics on salaries, regional distribution, types of employees, job turnover, and the number of graduates obtaining advanced degrees.

124. University of Michigan. Annual Report of Engineering Placement. Ann Arbor: Engineering Placement Service, College of Engineering. Annual.

Reports positions accepted by engineering graduates by location, type of work, type of employer, as well as data on placement activities.

125. "The Young Architect - A Profile," Architectural Record, December 1972, p. 81-85.

Reports results of a survey of 1,500 graduates of architectural schools in the classes of 1965, 1967, and 1969. Includes type of employer, percent who are registered architects, and other items.

B. Vocational Education

126. Connecticut State Department of Education, Division of Vocational Education. Graduate Follow Up, Statistical Data on Connecticut Students Completing Vocational Education Programs. Annual since 1967.

Data by type of training, secondary and post-secondary schools, number of graduates employed in related and in unrelated occupations, number out of the labor force, and mean hourly wages.

127. Duis, Harold. "Employment of Vocational Program Graduates," American Education, February 1968.

Gives data on entrance rates of graduates from vocational training programs into different occupational classifications.

128. Eninger, Max. The Process and Product of T & I High School Level Vocational Education in the United States. Pittsburgh: American Institutes for Research, September 1965.

Follow-up of trade and industrial vocational education program graduates.

129. Gentry, Dale N. Follow-up Vocational Studies at North Idaho Junior College. Moscow, Idaho: University of Idaho, College of Education The State Occupational Research Unit, July 1967.

Data is presented on student's labor market entry rates, a breakdown of occupations, transfer rates and percentages left unemployed. Data for graduates of programs in automobile body and fender repair, automobile mechanics, and industrial electronics.

130. Little, Kenneth J. and Whinfield, Richard W. Follow up of 1965 Graduates of Wisconsin Schools of Vocational, Technical and Adult Education. Madison: University of Wisconsin, Center for Studies in Vocational and Technical Education, Industrial Relations Research Institute, June 1970.

Data available on completions percentages of graduates achieving employment and types of employment, from a sample of 1,500 Wisconsin students.

131. Priebe, Donald. "A Follow-up of Vocational Agriculture Graduates," Agriculture Education, June 1968.

This study examines the employment patterns--rate of entry, choice of field, geographic breakdown--of vocational agriculture graduates.

132. Reich, Carol. "Vocational Specialization and Occupational Placement: A Follow-up Study," Vocational Guidance Quarterly, June 1973, p. 281-87.

Using a coding scheme based on the Dictionary of Occupational Titles, statistical tests on a sample of vocational students resulted in a poor relationship between training and placement.

133. Somers, Gerald G. The Effectiveness of Vocational and Technical Programs: A National Follow-up Study. Madison: University of Wisconsin, Center for Studies in Vocational and Technical Education, 1971.

Based on a 1969 survey of a national sample of 1966 vocational and technical program graduates, reports labor force and employment status by type of program, major occupational classification, and personal characteristics.

C. Federal Manpower Programs

134. Brown, Thomas C. Occupational Mobility Through MDTA Training. U. S. Department of Labor, Office of Manpower, Automation, and Training, Manpower Evaluation Report E-2, 1964.

Mobility patterns by occupational group and the effectiveness of MDTA programs in meeting needs. Based on Labor Department records.

135. Bureau of Social Science Research. Manpower Development and Training Act Projects:

Follow-up Study of MDTA Experimental and Demonstration Project at North Carolina A&T College. Leslie J. Silverman, BSSR 369, 1966.

Follow-up Study of MDTA Experimental and Demonstration Project Conducted by the Michigan Catholic Conference, Lansing, Angeles Buenaventura, BSSR 369, 1967.

Follow-up Study of MDTA E&D Project at Blue[illegible]eld State College, N. March Hoffman, BSSR 369, 1967.

Follow-up Study of MDTA E&D Project Conducted by Tuskegee Institute, Louise A. Johnson, BSSR 369, 1967.

Follow-up Study of MDTA E&D Project Conducted at Agricultural and Industrial State University of Nashville. Louise A. Johnson, BSSR 369, 1967.

Follow-up Study of Project Uplift, the MDTA E&D Project Conducte[illegible] by Florida A&M University, Leslie J. Silverman, BSSR 369, 1967.

Follow-up Study of MDTA Projects Conducted by Morgan State College, Diantha Stevenson, BSSR 369, 1967.

These follow-up studies contain statistical information on completions in the projects, percentages of persons obtaining desired employment, breakdowns of the occupations selected, and background data on the affected people in the projects.

136. Fahey, Frank. Follow-up Study of Project Able. U. S. Department of Labor, Manpower Administration, 1967.

Evaluates the results of an MDTA project to retrain and re-employ workers displaced by the closing of the Studebaker plants in South Bend, Indiana. Occupational detail included.

137. Follow-up of Graduates of Experimental and Demonstration Projects in the Washington, D.C. Area, 1966-67. Washington, D.C.: Catholic University of America, Bureau of Social Research, 1967.

Employment patterns of graduates of experimental MDTA programs for disadvantaged youth.

138. Lundon, H. H. How Fare M.D.T.A. Ex-Trainees--An 18 Month Follow-up Study of 500 Such Persons. St. Louis: University of Missouri, December 1967.

Data on 500 trainees from Manpower Development and Training Act programs. Entry rates into labor force, type of occupation, and type of employer are listed.

139. U. S. Department of Labor, Manpower Administration. Manpower Research and Development Projects. Annual since 1971.

Lists completed research and development projects funded by the Manpower Administration, with annotations.

D. Veterans

140. National Committee for Children and Youth. Recruitment, Training Placement and Follow-up of Rejected Armed Forces Volunteers in Baltimore, Maryland and Washington, D.C., 1967.

A study of the entrance rates into the labor market of rejected armed forces volunteers in Washington and Baltimore.

141. Sharp, Laure M. "Second Careers for Retired Military Personnel: Report on a Recent Survey," Manpower Training Facts, May 1965, p. 7-10.

Data from a survey on employment entrance rates for retired military personnel.

142. Sharp, Laure M. and Biderman, Albert D. Employment of Retired Military Personnel. BSSR 361. Washington, D.C.: Bureau of Social Science Research, 1966.

A detailed study of the employment practices of those leaving the military. Occupational information is given by age, race, and rank. Excerpts are published in the Monthly Labor Review, January and February, 1967.

143. _____ and Krasnegor, Rebecca. Five Years After the College Degree, Part IV, Military Service. Washington, D.C.: Bureau of Social Science Research, 1967.

For annotation, see A. above.

144. U. S. Department of Labor, Manpower Administration. Transferring Military Experience to Civilian Jobs: A Study of Selected Air Force Veterans. Manpower/Automation Research Monograph No. 8, 1968.

A follow-up study of Air Force veterans' choice of employment following military service.

145. Weinstein, Paul A. Labor Market Activity of Veterans: Some Aspects of Military Spillover. College Park: University of Maryland, 1969.

E. Other

146. Calvert, Robert Jr. "The Returning Peace Corps Volunteer - What Happens to Him?" Journal of College Placement, April-May 1966.

The director of the Peace Corps Career Information Service describes the fields of continuing education or employment selected by more than 6,000 returnees. By the end of 1967, according to estimates nearly 18,000 returned volunteers have been offered placement services.

147. Fifield, Marvin and Watson, Larry E. A Follow-up Study of Pocatello and Idaho Falls High School Graduates (1954-1963). Moscow, Idaho: University of Idaho, College of Education, the State Occupational Research Unit, June 1967.

Examines the entrance rates of graduates into the labor force, detailed occupational classification, and continued education.

148. Perella, Vera C. and Waldman, Elizabeth. "Out of School Youth--2 Years Later," Monthly Labor Review, August 1966, p. 869-66.

A 1965 resurvey of young men in a 1963 CPS study of early work experience. Assesses the relative progress of graduates and dropouts. Concludes that whatever the measure used--unemployment rate, earnings, or steadiness of employment--men with more education made greater advances over the 2-year period between the surveys.

149. Project Talent - One Year Follow-up Studies. Pittsburgh: University of Pittsburgh, School of Education, 1966.

Fron an original study in 1966 of a 5 percent sample of high school students (440,000) in 1,353 schools, the report compiles information on each group one year after graduation. It studies the nature of their employment and job satisfaction, the nature and extent of their post-high school education, and long-range career plans.

150. Project Talent - A 5-year Follow-Up Information on High School Graduates of 1960. Pittsburgh: University of Pittsburgh, School of Education, July 1969.

A continuing follow-up of the high school graduates, their activities during the 5-years after graduation, examining employment and continuing education.

151. U. S. Department of Health, Education, and Welfare, Office of Education. National Longitudinal Study of the High School Class of 1972. In process 1974.

Study is designed to follow-up a sample of 20,000 high school seniors of 1972 for several years to examine their post-secondary educational and occupational status, and its relation to high school training experience.

152. U. S. Department of Labor, Bureau of Apprenticeship and Training. Career Patterns of Former Apprentices. Bulletin No. T-147, March 1959.

Results of a survey of 3,278 workers who completed apprenticeship training in 1950, including data on the relationship of occupation to apprenticeship training, wage rates, veteran status, and other items. Occupations covered include eight construction trades, three metalworking trades, mechanic and repair trades, printing, and others.

153. Waldman, Elizabeth. Employment of High School Graduates and Dropouts in 1966. Special Labor Force Report No. 85. Bureau of Labor Statistics, July 1967.

Compares labor force entry rates of graduates and dropouts. Based on data from the October 1966 CPS. Some data for major occupational groups are included.

IV. Occupational Transfers

A. Census, Current Population Surveys, and Bureau of Labor Statistics Surveys

154. Bancroft, Gertrude and Garfinkle, Stuart. Job Mobility in 1961. Special Labor Force Report No. 35. Bureau of Labor Statistics, August 1963.

Reports job changing and labor force mobility data from the February 1962 Current Population Survey.

155. Rosenfeld, Carl and Perrella, Vera C. Why Women Start and Stop Working: A Study of Mobility. Special Labor Force Report No. 59, Bureau of Labor Statistics, September 1965.

Analyzes factors affecting labor force mobility of women 18-64 years of age, including age, presence of children, marital status, major occupational group status, and husband's income. Based on April 1964 Current Population Survey data.

156. Saben, Samuel. Occupational Mobility of Employed Workers. Special Labor Force Report No. 84. Bureau of Labor Statistics, June 1967.

Contains estimates of mobility for major occupational groups derived from January 1966 Current Poupulation Survey data.

157. U. S. Department of Commerce, Bureau of the Census. Census of Population: 1970. Subject Reports. Final Reports PC(2)-7E, Occupation and Residence in 1965, 1973.

Contains occupational mobility data for 10 major occupational groups.

158. _____, _____. Current Population Reports, Lifetime Occupational Mobility of Adult Males, Series P-23, No. 11. March 1962, and annually thereafter, various dates.

Presents data on occupational mobility of males by major occupational group.

159. U. S. Department of Labor, Bureau of Labor Statistics. Occupational Mobility of Scientists. Bulletin 1121, 1953.

Contains detailed mobility data for a sample of Ph.D. chemists, biologists, and physicists drawn from the 1948 American Men of Science register.

160. _____, _____. Mobility of Molders and Coremakers, 1940-1952. Bulletin 1162, 1954.

Studies the work experience, training, and personal characteristics of workers, including some data on occupational transfers. Based on a survey of 1,800 journeymen in eight metropolitan areas.

161. _____, _____. The Mobility of Tool and Die Makers, 1940-1951. Bulletin 1120, 1953.

Studies the work experience, training, and personal characteristics of workers, including some data on occupational transfers. Based on a survey of over 1,700 workers in seven large metalworking areas.

B. Postcensal Surveys

162. Cain, Glen and Hansen, W. Lee, Occupations of Engineers: Economic Aspects. Madison: University of Wisconsin, Social Systems Research Institute, January 1967 (unpublished).

163. Kincannon, C. L. "The Census Role in Scientific and Technical Manpower Programs for the 70's," American Statistical Association, Proceedings of the Social Statistics Section, 1972, 1973, p. 181-89.

This article describes the survey design, sample design and selection, data collection, and data processing procedures for the 1972 Post-censal Manpower Survey.

164. Schwartz, Mildred A. The United States College - Educated Population: 1960. Chicago: National Opinion Research Center, Report No. 102, October 1965.

165. Seltzer, Norman. "Post-censal Studies Program: Background and Content," American Statistical Association, Proceedings of the Social Statistics Section, 1963, 1964. p. 175-80.

166. _____. "The 1972 Post-censal Survey of Professional, Scientific and Technical Manpower," American Statistical Association, Proceedings of the Social Statistics Section, 1972, 1973, p. 178-80.

167. Stambler, Howard V. and Lefkowitz, Annie. "Education and Training of Technicians," Monthly Labor Review, November 1964, p. 1278-80.

168. U. S. Department of Commerce, Bureau of the Census. Characteristics of America's Scientists and Engineers: 1960 and 1962. Technical Paper 21, 1969.

Presents detailed national statistics on employment and economic and social characteristics of scientists and engineers.

169. _____, _____. Current Population Reports, Series P-23, No. 45, "Persons in Engineering, Scientific, and Technical Occupations: 1970 and 1972," July 1973.

This is the first of a series of reports on the 1972 professional, technical, and scientific manpower survey. It presents preliminary data on employment status, age, sex and education of persons identified in the 1970 census as working in engineering, scientific, and technical occupations.

170. U. S. Department of Labor, Bureau of Labor Statistics. Technician Manpower: Requirements, Resources and Training Needs, Bulletin 1512, 1966.

171. Warkov, Seymour and Marsh, John. The Education and Training of America's Scientists and Engineers: 1962. Chicago: National Opinion Research Center, Report No. 104, 1965.

C. National Longitudinal Surveys

172. Parnes, Herbert S. "Longitudinal Surveys: Prospects and Problems," Monthly Labor Review, February 1972, p. 11-15.

Discusses the surveys and lists additional articles and reports based on survey data.

173. U. S. Department of Labor, Manpower Administration. Career Thresholds. Manpower Research Monograph No. 16, 4 vols., 1970-1972.

Reports survey results for men 14-24 years of age.

174. _____, _____. Dual Careers. Manpower Research Monograph No. 21, 2 vols., 1970-1972.

Reports survey results for women 30-44 years of age.

175. _____, _____. The Pre-Retirement Years. Manpower Research Monograph No. 15, 3 vols., 1970-1972.

Reports survey results for males 45-59 years of age.

176. _____, _____. Yea[illegible]r Decision. Manpower Research Monograph, No. 24, 2 vols., 1971-1[illegible]/2.

Reports survey results for women 14-24 years of age.

D. Other

177. College Placement Council, The College Graduates - Turnover and Mobility. 1970.

Follow-up study of 1961 graduates examining turnover rates three years after graduation. Study separates men and women, different classes of employers, undergraduate majors, etc. Types of turnover include labor market dropouts, and type of employer.

178. Day, James F. Teacher Retirement in the United States. North Quincy, Mass.: Christopher Publishing House, 1971.

A detailed investigation of retirements, job transfers, and mobility in the teaching profession.

179. Hiestand, Dale L. Career Changes: Professional and Graduate Students After Thirty-Five. New York: Columbia University Press, 1970.

Discusses mobility in careers of graduate students at least 35 years old.

180. Lyons, Thomas F. Nursing Attitudes and Turnover, The Relation of Social-Psychological Variables to Turnover, Propensity to Leave and Absenteeism Among Hospital Staff Nurses. Iowa City: Iowa State University, Industrial Relations Center, 1968.

A study of patterns and causes of job transfers and mobility among hospital nurses.

181. National Research Council, National Academy of Sciences. Profiles of Ph.D.'s in the Sciences - Summary Report on Follow-up of Doctorate Cohorts, 1935-1960. Career Patterns Report No. 1, Publication 1293, 1965.

A study of a sample of 10,000 doctorate-holders in health-related sciences. Studies were made of employer categories, the geographic spread and post-doctoral migration, and on-the-job functions. Mobility is analyzed by geographic area, occupation, and field of specialization.

182. Somers, Gerald. Labor Mobility: An Evaluation of Pilot Projects in Michigan and Wisconsin. Madison: University of Wisconsin, Industrial Relations Research Institute, 1972.

Data is given on studies done in Michigan and Wisconsin on mobility in the labor force. Information is available by age and different occupations by major occupational group.

183. U. S. Department of Health, Education, and Welfare, Office of Education. Teacher Turnover in Public Elementary and Secondary Schools, 1959-60. OE-23002-60, Circular 675, 1963.

Contains turnover rates by age and sex.

184. U. S. Department of Labor, Bureau of Labor Statistics. Labor Mobility and Private Pension Plans - A Study of Vesting, Early Retirement, and Portability Provisions, Bulletin No. 1407, 1964.

Statistical data concerning the effects of different pension plans on occupational mobility and job transfers.

185. _____, _____. The Operation of Severance Pay Plans and Their Implications For Labor Mobility. Bulletin 1462, 1966.

Data is available concerning the effect of severance and pension plans as deterrents to occupational mobility.

186. _____, Manpower Administration. Career Mobility for Professionals in Human Service Agencies, MDTA Experimental and Demonstration Findings No. 8, 1969.

Lists data on different human service occupations in terms of occupational transfers and mobility.

V. Geographic Transfers

A. Immigration and Emigration

187. American Medical Association. Foreign Medical Graduates in the United States, 1970, 1971.

Monograph presents data on specialty, activity, location, year of graduation, country of birth, age, and sex of foreign physicians in the United States by country of graduation. Includes bibliography.

188. Grubel, H. G. and Scott, A. D. "Immigration of Scientists and Engineers to the U.S., 1949-1961," Journal of Political Economy, August 1969, p. 368-78.

Brings together data from several sources in order to form a cohesive picture of the "brain drain" into the U. S.

189. National Science Foundation. Scientists, Engineers, and Physicians from Abroad - Trends through Fiscal Year 1970. NSF 72-312, 1972.

190. _____. Immigrant Scientists and Engineers in the United States. A Study of Characteristics and Attitudes. NSF 73-302, 1973.

Reports on a survey conducted by NSF in mid-1970, of a sample of those admitted between F bruary 1964 and January 1969 and who filed address reports with INS in 1969.

191. North, David S. and Weissert, William G. Immigrants and the American Labor Market. Washington, D.C.: Trans-Century Corporation, April 1973 (unpublished).

Follow-up data on occupations in 1972 of immigrants entering the U. S. in FY 1970. Sponsored by Manpower Administration.

192. U. S. Department of Health, Education, and Welfare, Health Resources Administration, Bureau of Health Resources Development. Survey of Foreign Nurse Applicants for Registered Nurse Licensure in the U.S.A. Singletime survey for Bureau of Health Resources Development by American Nurses Association, in process 1974-75.

Survey to determine the number of foreign nurse graduate applicants and the proportion of them successfully passing state board examinations for registered licensure. Number of applicants, by state, and data on characteristics and major obstacles to success on the examinations derived from in-depth interviews in eight states.

193. _____, National Institutes of Health. The Foreign Medical Graduate: A Bibliography. DHEW Publication No. (NIH) 73-440, November 1972.

Citations of information about foreign medical graduates in the United States, including their education abroad, flow into the U. S., and their training and utilization in the U. S. Includes only publications prior to September 1972.

B. Internal Migration

194. Brown, David G. The Mobile Professors. Washington, D.C.: American Council on Education, 1967.

A study of how, where, and why college professors move within the academic labor market, based on a survey of 7,500 faculty members. Analyzes factors affecting mobility, including type of institutions, salaries, race and sex discrimination, balkanization of submarkets, and job search methods. The author presents recommendations for more effective use of academic manpower.

195. Ladinsky, Jack. "The Geographic Mobility of Professional and Technical Manpower," Journal of Human Resources, Fall 1967, p. 475-94.

Analysis of professional worker migration based on the 1960 Census Public Use Sample suggests that age is the most important factor affecting mobility, followed by income, education, regional location, sex, family size, and marital status.

196. Saben, Samuel. Geographic Mobility and Employment Status, March 1962-March 1963. Special Labor Force Report No. 44. Bureau of Labor Statistics, August 1964.

197. Sharp, Laure M. and Krasnegor, Rebecca. Five Years After the College Degree, Part V, Geographic Mobility. Washington, D.C.: Bureau of Social Science Research, 1967.

198. U. S. Department of Commerce, Bureau of the Census. Census of Population: 1960, Subject Reports, Final Report PC(2)-2B, Mobility for States and State Economic Areas, 1963.

Contains data on economic, demographic, and social characteristics, including major occupational group, of the population classified by mobility status.

199. _____, _____. Census of Population: 1970, Subject Reports, Final Report PC(2)-7E, Occupation and Residence in 1965, 1973.

Geographic mobility data for major occupational groups, comparable 1960 data are in Final Report PC(2)-2B, Mobility for States and State Economic Areas.

VI. Entrants From Outside the Labor Force

200. American Nurses Association. The Nation's Nurses: Inventory of Registered Professional Nurses. 1965.

Data on work activity and labor force mobility characteristics of R.N.'s.

201. National Education Association. Status of the American Public School Teacher, 1970-71. Research Report 1972-73, 1972.

Data on reentrants.

202. National Science Foundation. American Science Manpower, Annual 1961-1970.

Data on work activity of scientists in the NSF register.

203. U. S. Department of Commerce, Bureau of the Census. Census of Population: 1970, Subject Reports, Final Report PC(2)-6C, Persons Not Employed, 1973.

Data on occupational characteristics of persons not in the labor force or unemployed. Comparable 1960 data in Final Report PC(2)-6C, Labor Reserve.

VII. Separations From the Labor Force and Deaths.

A. Working Life Tables

204. Fullerton, Howard N. "A Table of Expected Working Life for Men, 1968", Monthly Labor Review, June 1971, p. 49-55.

Examines 1968 Current Population Survey data and provides estimates of expected working life for males of various ages in 1968. Includes a note on the technical construction of the tables.

205. U. S. Department of Labor, Bureau of Labor Statistics. Tables of Working Life: Length of Working Life for Men. Bulletin 1001, 1950.

Tables of working life for men in 1950. Includes an extensive description of working life patterns and a detailed exposition of the techniques used in the preparation of tables of working life.

206. _____, _____. Tables of Working Life for Women. 1950. Bulletin 1204, 1957.

207. _____, Manpower Administration. The Length of Working Life for Males, 1900-60, Manpower Report No. 8, July 1963.

Tables of working life for men in 1940, 1950, and 1960.

208. _____, _____. Work Life Expectancy and Training Needs of Women, Report No. 12, May 1967.

Tables of working life for women in 1960.

B. Additional Information

209. Bolt, Richard H., Kolton, Walter L. and Levine, Oscar H. "Doctoral Feedback into Higher Education," Science, May 14, 1965, p. 918-28.

Includes estimates of death and separation rates developed from the National Science Foundation's Register data.

210. Folk, Hugh and Yett, Donald E. "Methods of Estimating Occupational Attrition," Western Economic Journal, Vol. 6, No. 4, September 1968, p. 297-302.

Comparison of several methods for estimating nonwage related types of attrition, including age-specific occupational employment rates. Comparison of computations for nurses and engineers, 1950-1956.

211. Fullerton, Howard N. "A New Type of Working Life Table for Men," Monthly Labor Review, July 1972, p. 20-27.

Uses a "generation" life table in which the life spans of cohorts are followed through time, instead of a "period" life table based on mortality rates applicable to each age observed at one point in time. Includes tables, data sources, and technical appendix.

212. _____. "Sensitivity of Generation Tables of Working Life for Men to Different Projections of Labor Force Participation," American Statistical Association, Proceedings of the Social Statistics Section, 1972, p. 250-54.

213. Guralnick, Lillian. Mortality by Occupation and Industry Among Men 20 to 64 Years of Age: United States 1950. U. S. Department of Health, Education, and Welfare, Public Health Service, Vol. 3, No. 2, 1962.

Death rates by occupation and industry, 1950 Census industry and intermediate occupational classifications. Useful for identifying unusual occupational and industrial mortality patterns.

214. _____. "Occupational and Social Class Differences in Mortality," Proceedings of the 1955 Annual Conference, Millbank Memorial Fund, 1956, p. 61-73.

215. U. S. Department of Health, Education, and Welfare, Public Health Service. Mortality by Occupation and Cause of Death Among Men 20-64 Years of Age: United States, 1950. Vital Statistics Special Reports, Vol. 53, No. 3, September 1963.

Death rates by occupation and cause of death, 1950 Census intermediate occupational classification. Discussion of limitations of the rates. Useful for identifying unusual occupational mortality patterns.

216. U. S. Department of Labor, Bureau of Labor Statistics. Tomorrow's Manpower Needs, Bulletin 1606, Vol. 1, February 1969, and Supplement 4, forthcoming 1974.

Vol. 1, discusses the development of death and separation rates, and shows rates for individual occupations by sex in Appendix A. Supplement 4 contains estimates of occupational separations for states.

217. Wolfbein, Seymour L. Changing Patterns of Working Life, U.S. Department of Labor, Manpower Administration, August 1963.

Tables of working life for men, 1960, and summary data for women. Text discusses retirement patterns, changes in patterns over time, and in employment and training patterns for older workers.

VIII. Occupational Earnings

218. American Chemical Society. 1972 Report on Chemists' Salaries. 1972. (Annual since 1962).

Salary data reported from a comprehensive survey of ASC members, including detail by degree status, type of employer, sex, work activity, field, and region. Data on chemical engineers and chemists are also reported annually in the ASC journal Chemical and Engineering News.

219. College Placement Council, Inc. Men's Salary Survey and Women's Salary Survey, annual.

Data include high, low, and average beginning salaries in business and industry, by type of curriculum and type of employment (industry), for recent college graduates. Data are collected from college placement offices, covering male graduates in accounting, business, humanities-social sciences, marketing, seven areas of engineering, agricultural science, chemistry-math-physics, and computer science, and female graduates in accounting, business communications, community service work, EDP, engineering, health, home economics, libraries, mathematics, merchandising, research, and secretarial services.

220. Endicott, Frank S. Trends in Employment of College and University Graduates in Business and Industry. American Society for Personnel Administration, annual since 1946.

Survey of beginning monthly salaries in 185 companies representing large and medium sized firms in 22 states and 20 industries. Salaries are for bachelor's and master's degree holders in engineering, accounting, sales, business administration, liberal arts, production management, physics, chemistry, mathematics, economics, and other fields.

221. Engineering Manpower Commission. Professional Income of Engineers. New York: Engineers Joint Council, annual.

222. _____. Salaries of Engineering Technicians. New York: Engineers Joint Council, annual.

223. Interstate Commerce Commission. Wage Statistics of Class I Railroads in the United States, Statement No. A-300, annual.

224. National Education Association. Economic Status of the Teaching Profession, 1971-72, Research Report 1972-R2, 1972. Annual by academic year since 1962-63.

Contains salary data from biennial NEA surveys and from the Office of Education. Detail include sex, size or type of school, region, academic rank, degree, and comparisons with other occupations.

225. _____. Faculty Salary Schedules in Colleges and Universities, 1971-72. Research Report 1972-R10, annual by academic year since 1967-68.

Reports mean minimum, and maximum salaries by rank, type of institution, size of enrollment, region, degree, and individual institution. Data are confined to 4-year institutions offering bachelor's or higher degrees, and are available from 1965-66.

226. _____. Faculty Salary Schedules in Community - Junior Colleges, 1971-72. Research Report 1972-R9, 1972. Annual by academic year since 1967-68.

Contains similar data to that reported for colleges and universities, but confined to institutions offering less than a bachelor's degree.

227. National Science Foundation. American Science Manpower. Annual 1954-1970.

Reports employment, earnings, and other characteristics of persons listed in the National Register of Scientific and Technical Personnel.

228. Professional and Business Associations. The following associations or periodicals conduct salary surveys for occupations of special interest to them:

Advertising Age (magazine)
American Dental Association
American Dental Assistants Association
American Dental Hygenists Association
American Insurance Association/American Mutual Insurance Alliance
American Marketing Association
American Medical Association
American Medical Record Association
American Osteopathic Association
American Speech and Hearing Association
Business Automation, EDP Salary Survey
Flight Engineers International Association
Life Office Management Association, Actuarial Student Salary Survey
National Association of Certified Dental Laboratories
National Farm and Power Equipment Dealers Association
Public Personnel Association, Pay Rates in Public Service

229. U. S. Department of Commerce, Bureau of the Census. Census of Population: 1970 Subject Reports, Final Report PC(2)-7A, Occupational Characteristics, 1973.

Includes median 1969 earnings for males and females in the experienced civilian labor force as well as employment and data on worker characteristics. Data from 1960 census are in a 1963 publication of the same title.

230. _____, _____. Current Population Reports, Series P-60. Earnings by major occupation group derived from Current Population Surveys.

231. U. S. Department of Health, Education, and Welfare, Office of Education. Higher Education Salaries. Annual by academic year.

Salary data by type of institution, length of contract (e.g. 9-month and 12-month), and academic rank.

232. _____, _____. Statistics of State School Systems. Annual by academic year.

Average salary levels of instructional staff in public elementary and secondary schools by state.

233. _____. Social Security Administration. Income of Physicians, Osteopaths, and Dentists from Private Practice, 1965-69. DHEW Pub. No. (SSA)73-11852, Staff Paper No. 12, 1972.

Compiles published data from the Internal Revenue Service on incomes of physicians, osteopaths, and dentists. Emphasizes trends in their income components since the advent of Medicare and Medicaid. Data from other sources are also used to analyze comparative income trends.

234. U. S. Department of Labor, Bureau of Labor Statistics. Area Wage Surveys. 2 vols., Metropolitan Areas, United States and Regional Summaries, and Selected Metropolitan Areas, plus separate volumes for individual cities. Annual since 1950, various bulletin numbers. Before Bulletin 1465 (1965-66) the series were called Occupational Wage Surveys.

Earnings data by sex, by city, region, and U. S. for about 90 metropolitan areas, covering 76 occupations in six industry divisions. Also includes information on scheduled weekly hours, shift differential practices, fringe benefits, and wage trends.

235. _____. A Directory of Industry Wage Surveys and Union Wages and Hours Studies, 1960-73, 1973.

Lists industries covered in the BLS wage survey program including publication titles, bulletin numbers, and limited description of their content.

236. _____, _____. National Survey of Administrative, Technical, and Clerical Pay. Annual since winter 1959-60, various bulletins.

Data on salary levels and distributions for 80 occupation-work levels, including accounting, legal services, personnel management, engineering and chemistry, buying, clerical supervisory, drafting, and clerical jobs. Averages are shown for annual, monthly, or weekly rates, excluding overtime pay. Data are shown for total U.S., for metropolitan areas combined, for establishments of 2,500 or more, and for major industry divisions.

237. _____, _____. Salary Trends, including the following

Salary Trends: City Public School Teachers, 1925-65, Bulletin 1504, 1966.
Salary Trends: Federal Classified Employees, 1939-64, Bulletin 1444, 1965.
Salary Trends: Firemen and Policemen, 1924-64, Bulletin 1445, 1965.

Additional data, except for teachers, appear in annual Current Wage Developments. Current data for teachers appear biennially in CWD. Data include salary levels and trends for regions and city-size groups, as well as national data. Except for Federal workers, coverage is limited to cities of 100,000 or more. Data are compiled from various sources, including the U. S. Civil Service Commission, the National Education Association, and the International City Management Association, firefighter and police unions, and BLS surveys.

238. _____, _____. Union Wages and Hours. Annual since 1936 for building trades, 1950 for printing, 1946 for local transit, and 1943 for local trucking; various bulletins.

Data include averages and distributions of union scales of wages and hours by industry, region, and city. Wage rates and wage rate indexes are shown by skill level (e.g., journeymen) as well as by occupation. Data reflect only the wage rates set in union - management contracts, and not actual hourly earnings.

239. U. S. Department of Transportation, Federal Aviation Administration. FAA Handbook. Annual.

240. U. S. Maritime Administration, Division of Manpower Studies. Unpublished data on merchant marine base pay.

241. University of Texas. Survey of Hospital and Medical School Salaries, 1970 and 1968.

IX. Analytical Studies

A. Issues in Occupational and Manpower Analysis

242. Becker, Gary. Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. New York: National Bureau of Economic Research, Columbia University Press, 1964.

Becker's volume is one of the major works in the field of human capital economics. Education and manpower development are treated as investments in human capital, with costs and return as criteria for investment decisions.

243. Bezdek, Roger H. and Getzel, Barry. Forecasting the Job Content and Skill Requirements of the U. S. Economy. Economic Research Group, Working Paper No. 10. Urbana: University of Illinois, Center for Advanced Computation, 1972.

Examines the problem of estimating education and training requirements for specific occupations, utilizing the Dictionary of Occupational Titles and related research by Eckhaus (see below).

244. Bolino, August C. Occupational Education as a Source of Economic Growth. Springfield, Va.: National Technical Information Service, November 1972.

Surveys the history and status of all types of occupational education. Prepared for the Manpower Administration.

245. Boulding, Kenneth E. "An Economist's View of the Manpower Concept" in Proceedings of the Conference on the Utilization of Scientific and Professional Manpower. New York: Columbia University Press, 1954, p. 11-33.

Boulding labels the manpower concept as "repulsive, dangerous, disgusting, fascistic, communistic, incompatible with the ideals of liberal democracy, and unsuitable company for the minds of the young." His vigorous attack relies on a classical "hidden hand" interpretation of the market, and concludes that manpower planning will at best interfere with the market's natural tendency toward equilibrium. Comments summarized by Robert M. MacIver.

246. Bowles, Samuel. Migration as Investment: Empirical Tests of the Human Investment Approach to Geographical Mobility. Discussion Paper No. 51. Cambridge: Harvard University, Program on Regional and Urban Economics. 1969 (mimeo)

A simple migration model, tested with data on net migration from the U. S. South for 1955-60, supports the hypothesis that geographic mobility is primarily a response to economic incentives, and therefore is consistent with the human capital approach to analysis.

247. Bowman, Mary Jean. "Educational Shortage and Excess," Canadian Journal of Economics and Political Science, November 1963, p. 446-61.

Bowman reviews traditional rising prices, relative income, and status approaches to identifying manpower shortage and excess, as well as the more recent rate-of-return approach, emphasizing their normative as well as economic content. She concludes that shortage and excess have no valid meaning unless social costs and returns are considered, and that the most reliable indicators of impalances are to be found by examining the allocation processes themselves. A brief digression on the situation for teachers is included.

248. Eckaus, R. S. "Economic Criteria for Education and Training," Review of Economic and Statistics, May 1964, p. 181-90.

Eckaus criticizes the rate-of-return approach to developing economic criteria for educational planning. He then proposes an alternative method of computing educational requirements using estimates from the Dictionary of Occupational Titles of education and training requirements by occupation, and projections of occupational employment needs.

249. Fine, Sidney A. "A Re-examination of Transferability of Skills," two parts, Monthly Labor Review, July 1957, p. 803-10; and August 1957, p. 938-48.

Part I examines the assumptions and concepts involved in skill transferability and reviews earlier research. Part II draws upon occupations classification of the U.S. Employment Service to provide guidelines for a systematic approach to the study of transferability of skill.

250. Hansen, W. Lee. "The Economics of Scientific and Engineering Manpower," Journal of Human Resources, Spring 1967, p. 191-220.

Hansen attempts to define some of the issues in the discussion of "shortages" by surveying the various positions taken, alternative approaches to research, and the analytical efforts of economists. He then explores in more detail the projection approach, and proposes a rate-of-return approach to analyzing occupational supply and identifying shortages and surpluses. Comment by David Brown and Claus A. Moser.

251. _____. "Labor Force and Occupational Projections," in Proceedings of the 18th Annual Winter Meeting. Madison: Industrial Relations Research Association, 1966.

Hansen reviews and critiques the various types and uses of projections, emphasizing the need for supply projections to make the requirements estimates more meaningful. He contends that what is most needed is not more projections but more research on occupational choice and the operation of the labor market.

252. _____. "Total and Private Rates of Return to Investment in Schooling," Journal of Political Economy, April 1963, p. 128-40.

Hansen discusses rate of return as an empirical measure of shortages.

253. Hollister, R. G. "The Economics of Manpower Forecasting," International Labour Review, April 1964, p. 371-97.

Hollister presents a theoretical analysis of certain aspects of manpower forecasting, in particular the use of present occupational distribution in forecasting, and the effects of supply and technological factors on the occupational distribution.

254. Kotz, Arnold, ed. Occupational Education: Planning and Programming. Menlo Park, Calif.: Stanford Research Institute, 1967. 2 volumes.

This work reviews new approaches to planning and programming occupational education, with major emphasis on PPB. Contains articles by Garth Mangum, Norman Medvin, Thayne Robson, and others. Prepared for the U. S. Office of Education.

255. March, Georgianna B., ed. Conference on Occupational Data Requirements for Educational Planning. Madison: University of Wisconsin, Center for Studies in Vocational and Technical Education, 1966. Summarized in Journal of Human Resources, Summer 1966, p. 54-66.

The conference gave voice to two distinctive schools of thought. They first felt that the need for occupational data was urgent and stressed its availability as a prerequisite to intelligent planning. The second denied the usefulness of such data, emphasing weak methodologies and problems inherent in obtaining accurate job vacancy data.

256. Mestre, Elroy R. Economic Minorities in Manpower Development. Lexington, Mass.: Heath Lexington Books, 1971.

Chapter 2 reviews problems of manpower development in the American economy such as the level of economic activity and economic security, with emphasis on mobility and minorities. Mestre presents good arguments for the usefulness of manpower policy for eliminating or offsetting market imperfections, structural imbalances, adverse effects of cut-backs, and promoting economic security.

257. Miller, Ann R. Current Occupation and Past Training of Adult Workers, Statistical Evaluation Report No. 7, Bureau of the Budget, March 1968 (mimeo).

Analyzes unpublished data from the April 1963 Current Population Survey. Examines the feasibility of collecting data on the relationship of training and occupation, for improving supply projections and studying changing occupational structures. Prepared for the Interagency Committee on Occupational Classification.

258. Stigler, George. "The Economics of Information," Journal of Political Economy. June 1961; and "Information in the Labor Market," Journal of Political Economy, Supplement, October 1962.

Stigler examines the relationship between labor market information and career choice.

259. Strauss, George. "Apprenticeship: An Evaluation of the Needs," in Arthur M. Ross, ed., Employment Policy and the Labor Market. Berkeley: University of California Press, 1965.

Evaluates the data on apprenticeship and examines concepts such as the problem of defining who is an apprentice.

260. Young, Robert C., Clive, William V. and Miles, Benton E. Vocational Education Planning: Manpower Priorities and Dollars. Columbus: The Ohio State University, Center for Vocational and Technical Education, 1972.

This volume discusses the role of supply-demand data in manpower and vocational education planning. Includes bibliography.

B. Studies of Individual Occupations and Occupational Groups

261. Altman, Stuart H. The Present and Future Supply of Registered Nurses. DHEW Publication No. (NIH)72-134 U. S. Department of Health, Education and Welfare, Public Health Service, 1971.

Altman presents an extensive discussion of the changing market for nurses during the post-war years. He examines the breakdown of some noncompetitive characteristics of the hospital industry, the decline of hospital nursing schools and the growth of associate degree programs, rising nurse salaries, unionization, and increased mobility of female workers. He derives a model of nursing supply from models of family labor supply and aggregate labor supply of women. Projections of future supply are included.

262. Altman, Stuart H. and Fechter, Alan. "The Supply of Military Personnel in the Absence of a Draft," American Economic Review, May 1967, p. 19-31.

The article summarizes methods used to estimate the cost of replacing drafted personnel with an all-volunteer force. Factors affecting the level of enlistments are analyzed, including civilian unemployment and draft pressure. The effect of increased pay on volunteer accessions to the Armed Forces is analyzed for enlistees and officers. Elasticities are computed and used to estimate payroll costs of a volunteer force.

263. Alchain, A. A., Arrow, K. J. and Capron, W. M. An Economic Analysis of the Market for Scientists and Engineers. Chicago: Rand McNally, 1958.

The authors review various concepts of shortages and present an extensive analysis of the market for scientists and engineers, including such issues as R&D contracting practices, government employment policies, and "stocking" of high-skill personnel by firms. Long-and short-term supply problems are discussed in relation to salary and noneconomic factors influencing students' enrollments and completion of training.

264. American Council on Education. "A New Look at the Supply of College Teachers," Educational Record, Summer 1965.

265. Arrow, Kenneth J. and Capron, William M. "Dynamic Shortages and Price Rises; the Engineer Scientist Case," Quarterly Journal of Economics, May 1959, p. 292-308.

Persistent shortages of engineers and scientists in the 1950's in spite of increasing salaries were often interpreted as a failure of the price mechanism. Arrow and Capron argue that the price mechanism did not fail, but simply did not adjust quickly enough to meet the continually expanding demand for scientists and engineers. They present a model of dynamic shortages to explain the market phenomena of the 1950's--simultaneous rising salaries and "shortage" conditions. Much of the paper is taken from Alchain, Arrow, and Capron, 1958.

266. Bayer, Alen E. "Nurse Supply: It's Better Than We Thought," The Modern Hospital, July 1967.

Bayer contends that the elasticity of labor force participation for inactive R.N.'s could be increased by providing more flexible hours and improved working conditions.

267. Benham, Lee. "The Labor Market for Registered Nurses: A Three-Equation Model," Review of Economics and Statistics, August 1971, p. 246-52.

Benham explores the factors influencing the numbers of employed registered nurses and their earnings across states. The simple model includes one structural equation for demand, one for labor force participation, and one for geographic location. Results are of limited usefulness because of poor data.

268. Bishop, Christine E. "Manpower Policy and the Supply of Nurses," Industrial Relations, February 1973, p. 86-94.

Bishop explores the potential for short-run expansion of the supply of nurses. A model is constructed which estimates the elasticity of the labor force participation of nurses with respect to salary, and is tested on a large cross-section sample of married nurses in Massachusetts. Regression analysis produces positive but small estimates of elasticity. Bishop applies familiar techniques of labor force participation analysis, such as comparing salaries to "wages" earned from housework in the area of occupational labor force participation.

269. Blank, David and Stigler, George. The Demand and Supply of Scientific and Technical Personnel. New York: National Bureau of Economic Research, 1957.

Blank and Stigler conclude that no significant shortage of engineers and scientists occurred during the postwar period. A shortage is said to occur when the supply of workers increases less rapidly than the number demanded at salaries paid in the recent past. The authors rely primarily on comparisons of engineers with earnings of other professional groups.

270. Bognanno, Mario F, Zaidi, Mahmood A. and Hixon, Jesse S. The Married Women's Supply of Labor: A Microstudy of the Professional Nurse. Minneapolis: Industrial Relations Center, University of Minnesota, February 1972.

Estimates the elasticities of labor supply of married nurses with respect to wages and husband's income. Based on a limited sample of nurses in Iowa in 1968.

271. Bumas, Lester O. "Engineering Occupational Choice, 1950-1965", Industrial Relations, February 1970, p. 231-42.

Bumas challenges the conventional economic interpretation of relative earnings as a major determinant of occupational choice. He contends that employment opportunity is the primary explanatory variable and illustrates the hypothesis with regression analysis of engineering students for 1950-1965.

272. Cain, Glen and Hansen, W. Lee. Occupations of Engineers: Economic Aspects. Madison: University of Wisconsin, Social Systems Research Institute, January 1967 (unpublished).

273. _____, _____, and Freeman, Richard B. Labor Market Analysis of Engineers and Technical Workers. Baltimore: Johns Hopkins University Press, 1973.

Analysis of supply, demand, and utilization of engineers and technicians, including reviews of several types of supply models and use of cost benefit analysis and projections in policy decision making.

274. Cartter, Alan. "The Supply Of and Demand For College Teachers," Journal of Human Resources, Summer 1966, p. 22-38.

Cartter takes issue with those who feared a crisis in higher education because of shortages of Ph.D. level personnel and deteriorating quality of faculty. He argues that the quality of faculty actually improved during 1955-1965, and that the "shortages" or sellers' market among Ph.D.'s would disappear shortly after 1966. The article summarizes the events of the previous 10 years, and presents a growth model for projecting supply and demand to 1985. The model includes independent projections of enrollments, development of replacement needs estimates and faculty-student ratios, and estimates of production of doctorates, and doctorates entering college teaching.

275. Committee on the National Science Foundation Report on the Economics Profession. The Structure of Economists' Employment and Salaries, 1964. American Economic Review, Supplement, December 1965.

This analysis of the economics profession based on NSF Register data gives particular attention to the problems of occupational definition and the relationship between education and salary. Rates of return are not calculated.

276. Deane, R. T. Simulating an Econometric Model of the Market for Nurses. Unpublished Ph.D. dissertation, University of California at Los Angeles, 1971.

277. Fein, Roshi. The Doctor Shortage: An Economic Diagnosis. Washington: The Brookings Institution, 1967.

Fein analyzes the demand for physicians' services and the supply of physicians, emphasizing the problems of defining a shortage and measuring and pricing medical services. He examines difficulties of applying economic analysis where profit maximization is not the only or the primary goal of the physician or patient.

278. Folger, John, Astin, Helen S. and Bayer, Alan E. Human Resources and Higher Education, Staff Report of the Commission on Human Resources and Advanced Education. New York: Russell Sage Foundation, 1970.

This volume reviews the supply and demand situation for many degree fields, concentrating on degrees confered and deaths and retirements. Includes discussion of difficulties in planning and implementing effective manpower and educational policy.

279. Folk, Hugh. "Another Look at the Shortage of Engineers and Scientists," Unpublished Working Paper No. 6512 for the Department of Economics. St. Louis: University of Missouri, September 1964.

280. _____. The Shortage of Scientists and Engineers. Lexington, Mass.: D.C. Heath and Co., 1970.

281. Franke, Walter and Sobel, Irvin. The Shortage of Skilled and Technical Workers, Lexington, Mass.: Heath Lexington Books, 1970.

The authors discuss conflicting views on the concept of shortages and present supply analysis for six craft and technical occupations in St. Louis and Chicago.

282. Freeman, Richard B. "Engineers and Scientists in the Industrial Economy." Cambridge: Harvard University, 1971, mimeo.

Freeman examines three aspects of change in industrial economies: 1) the contribution of scientific manpower to the rate and nature of change, 2) the impact of change on the labor market, and 3) the determination of the number of persons devoted to scientific-technical change. He presents factual and theoretical structures for analysis including models of research and development activity and the operation of the labor market under conditions of change.

283. _____. The Market for College-Trained Manpower, A Study in the Economics of Career Choice. Cambridge, Mass.: Harvard University Press, 1971.

Freeman uses traditional price theory to develop econometric models of the postwar market for college-trained manpower, and tests the models for accounting, business administration, mathematics, chemistry, and engineering. He concludes that 1) career decisions are substantially influenced by economic incentives, 2) salaries are determined by the intersection of supply and demand curves with time lags, 3) changes in the market are explained by two adjustment or feedback models, and 4) the university system responds to market incentives by creating the necessary training opportunities.

284. Friedman, Milton and Juznets, Simon. Income from Professional Practice. New York: National Bureau of Research, Publication No. 45, 1945.

This volume is an early study of career choice and labor markets. The authors present empirical analyses of the medical professions, with special concern for the potential for monopolistically induced shortages because of restricted medical school enrollments.

285. Hansen, W. Lee. "The Economics of Scientific and Engineering Manpower," Journal of Human Resources, Spring 1967, p. 191-220.

See listing in "Issues" section.

286. _____. "Educational Plans and Teacher Supply," Comparative Education Review, October 1962, p. 136-41.

Hansen discusses why American and British teacher forecasts have gone wrong and reviews the factors influencing changes in the demand and supply of teachers.

287. _____. "The Shortage of Engineers," Review of Economics and Statistics, August 1961, p. 251-56.

288. _____. "Shortages and Investment in Health Manpower," in The Economics of Health and Medical Care. Proceedings of a conference on the Economics of Health and Medical Care, May 1962, Ann Arbor, Mich.: The University of Michigan, 1965.

Hansen's article is one of the first to use rate-of-return evidence to analyze shortages of qualified manpower, in this case physicians and dentists. He compares rates of return between 1939 and 1956, showing that the shortage of doctors and dentists has declined since 1949.

289. Harris, Seymour. The Market for College Graduates. Cambridge, Mass.: Harvard University Press, 1949.

Harris argues that the United States would face an excess of college trained manpower during the 1950's resulting from the tremendous increase in college enrollments after the war. Includes extensive documentation and supporting statistics.

290. Hurd, Richard W. "Equilibrium Vacancies in a Labor-Market Dominated by Non-Profit Firms: The Shortage of Nurses," Review of Economics and Statistics, May 1973, p. 234-40.

Hurd's statistical tests of the oligopsony explanation of the shortage of nurses find supportive results from three data sources: the 1960 Census and the 1960 and 1966 BLS Hospital surveys. Equations are presented and policy implications discussed.

291. Kehrer, Barbara H. The Nursing Shortage and Public Policy-An Economic Analysis of the Demand of Hospital Nurses in Connecticut. Unpublished Ph.D. dissertation, Yale University, 1970.

292. Kershaw, Joseph A. and McKean, Roland N. Teacher Shortages and Salary Schedules, New York: McGraw Hill Inc., 1962.

293. Klarman, Herbert E. The Economics of Health. New York: Columbia University Press, 1965.

This volume is a thorough introduction to the field of health economics. Chapters are included on the supply of health personnel and on issues related to the economics of education, as well as a comprehensive bibliography.

294. Klarman, Herbert E. ed. Empirical Studies in Health Economics. Baltimore: Johns Hopkins Press, 1970.

This volume includes Stuart Altman's "The Structure of Nursing Education and Its Impact On Supply," Donald Yett's "The Chronic Shortage of Nurses: A Public Policy Dilemma," and other studies.

295. Lewin, David. "Wage Parity and the Supply of Policemen and Firemen," Industrial Relations, February 1973, p. 77-85.

Lewin presents a nonstatistical comparison of the duties and costs of hiring policemen and firemen in Los Angeles County. He recommends removal of the parity policy, i.e., equal starting salaries, in order to increase flexibility in hiring policemen.

296. Mack, Donald R. A Model of the Supply and Demand for Engineers. Schenectady, New York: General Electric Company, 1973.

Presents a feedback model of demand, enrollment/attrition, and unemployment of graduate engineers, using a system of algegraic and first-order differential equations.

297. Matilla, J. Peter. The Impact of Extending Minimum Wages to Private Household Workers. RE Project 3270, Final Report. Columbus: The Ohio State University, Research Foundation, October 1971.

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303. National Science Foundation, The Long-Range Demand for Scientific and Technical Personnel, A Methodological Study. Prepared by the U. S. Department of Labor, Bureau of Labor Statistics, 1961.

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Porter applies the Harrod growth model borrowed from economic development theory to explain the expansion of higher education. Faculties are treated as capital-input, and as an input produced by higher education itself. He concludes that the strain of faculty expansion during the 1960's will automatically reduce the strain during the 1970's, and possible produce a slack thereafter. Salaries are also analyzed.

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